

54321

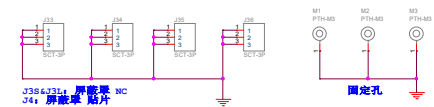
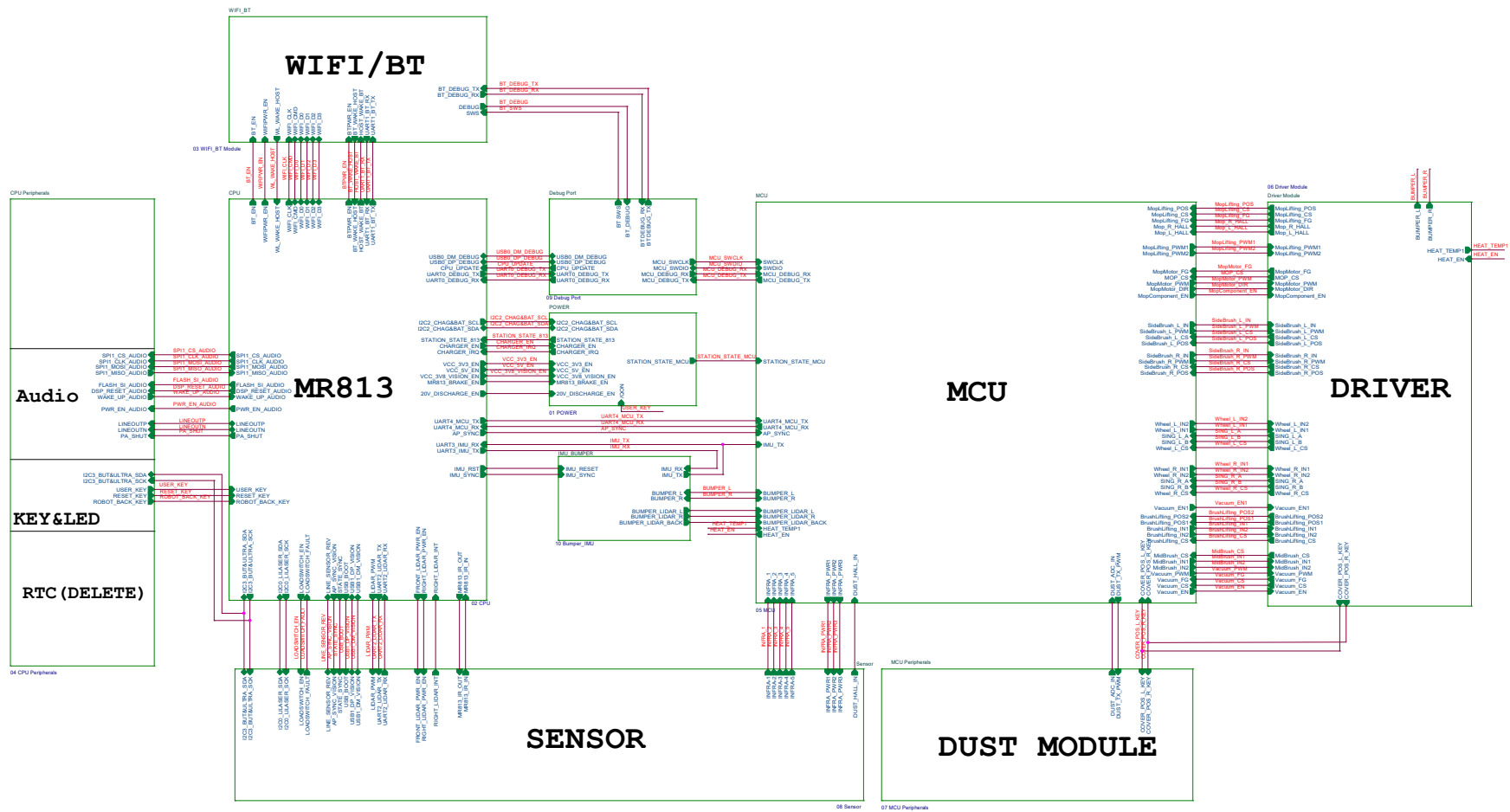
项目名称：IP1207 ROBOT MB01

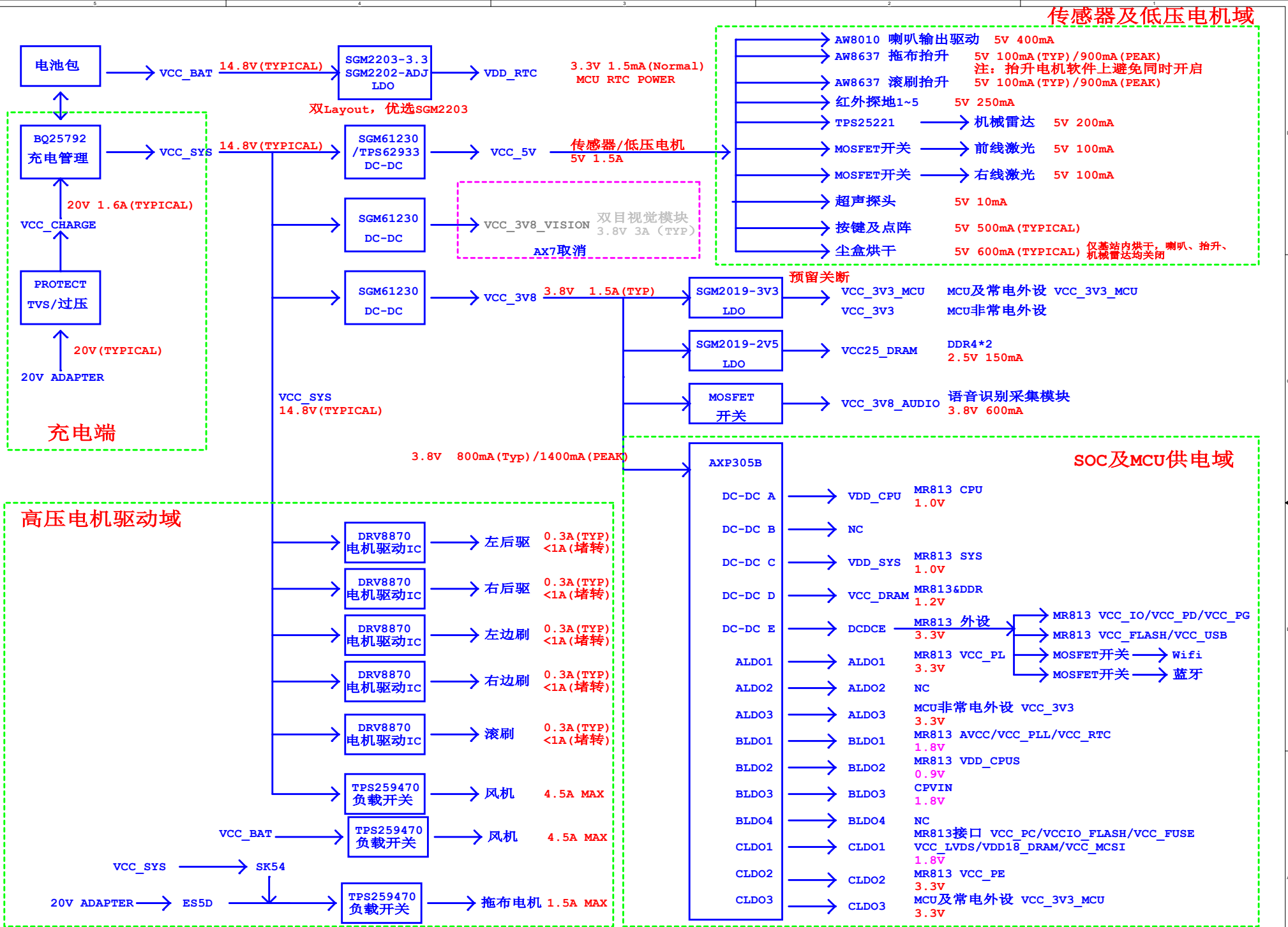
项目说明：扫地机器人主板AX7 V1_1401上修改

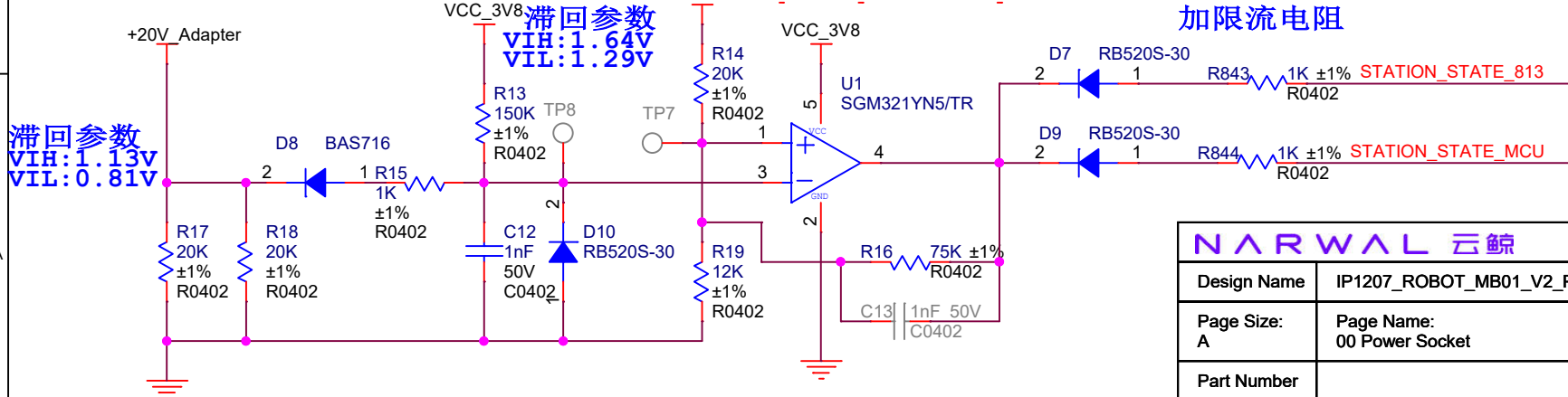
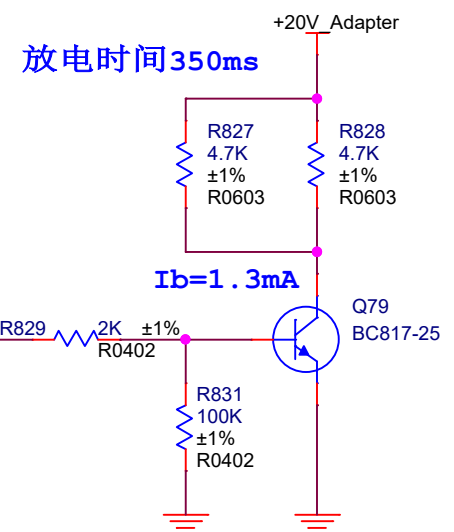
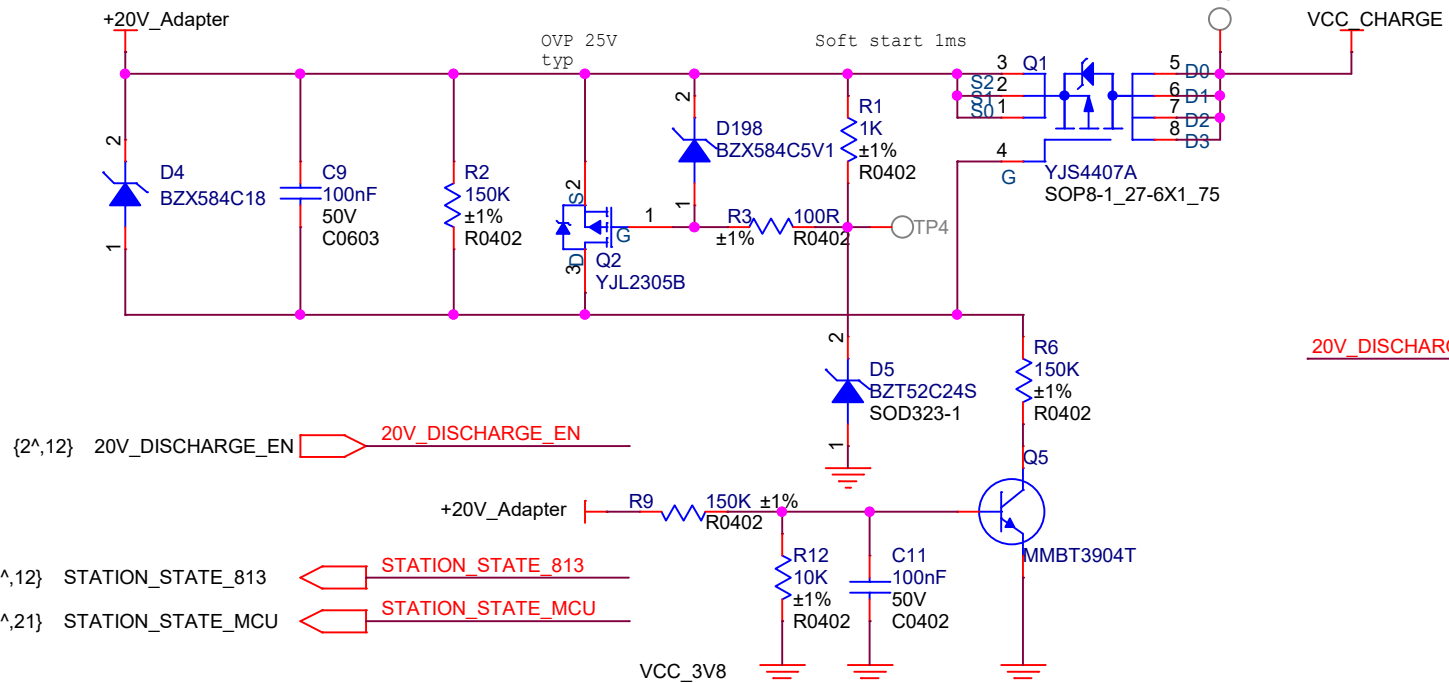
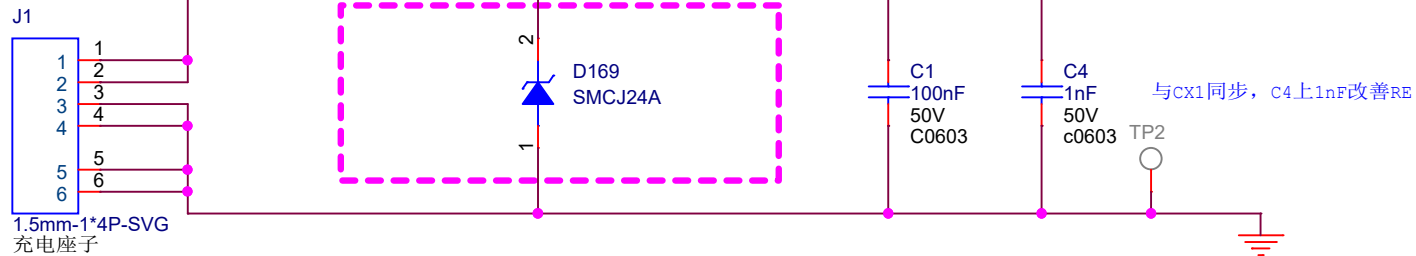
版本号	作者	更改说明	修订时间
V1	梁伟粤	1、不改板。针对以下内容修改BOM原理图 2、MCU、CPU版本号修改为V0 3、双目修改为前线激光 4、语音模块NC 5、滚刷抬升NC 6、尘盒检测NC	2024.3.22
V2	梁伟粤	1、边刷控制正反转 2、MCU版本号修改为V2	2024.7.18

NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 01 Revision History	Rev: V1
Part Number		Sheet 1 of 41
Modify Date	Wednesday, July 24, 2024	

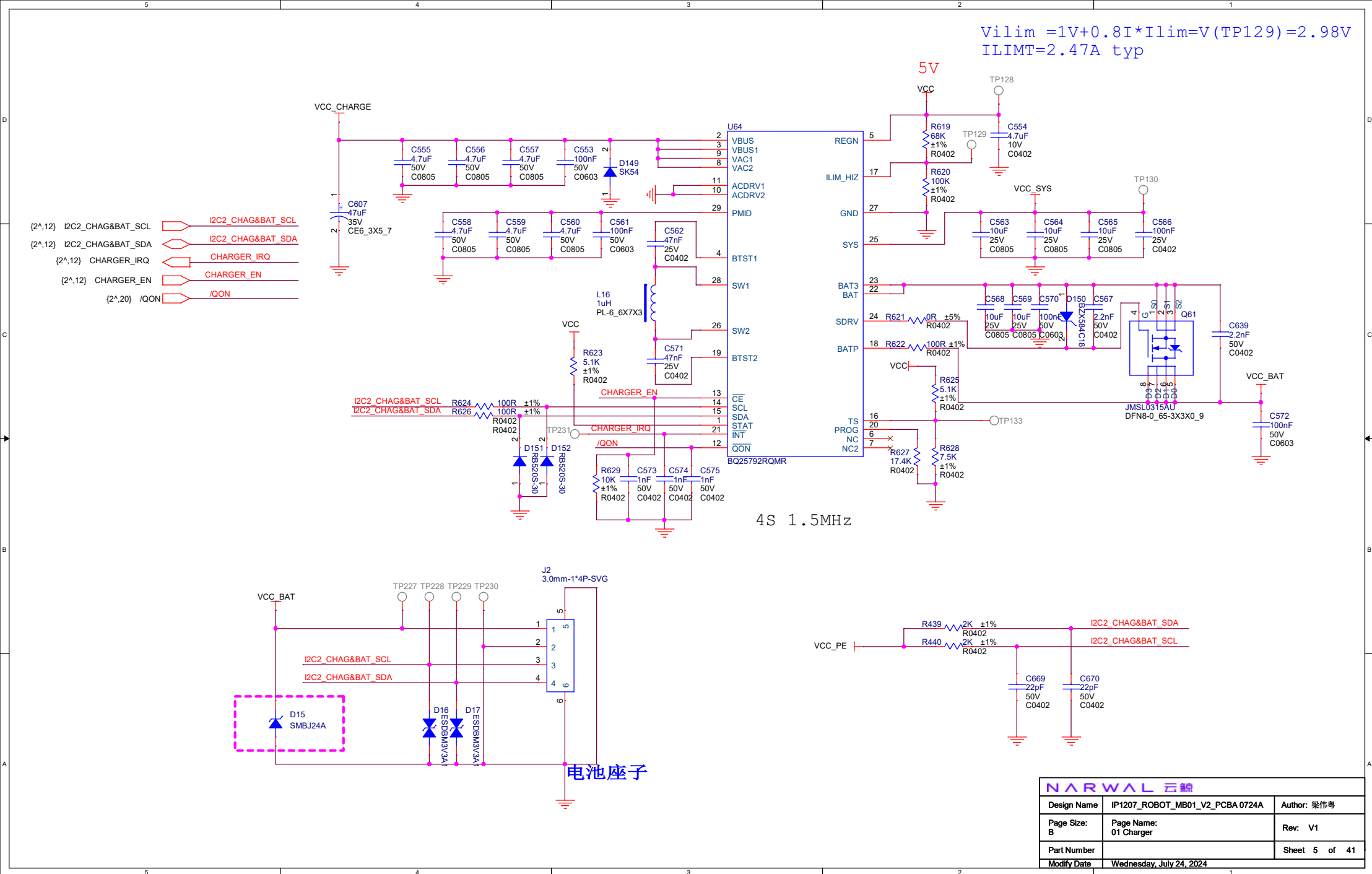
54321





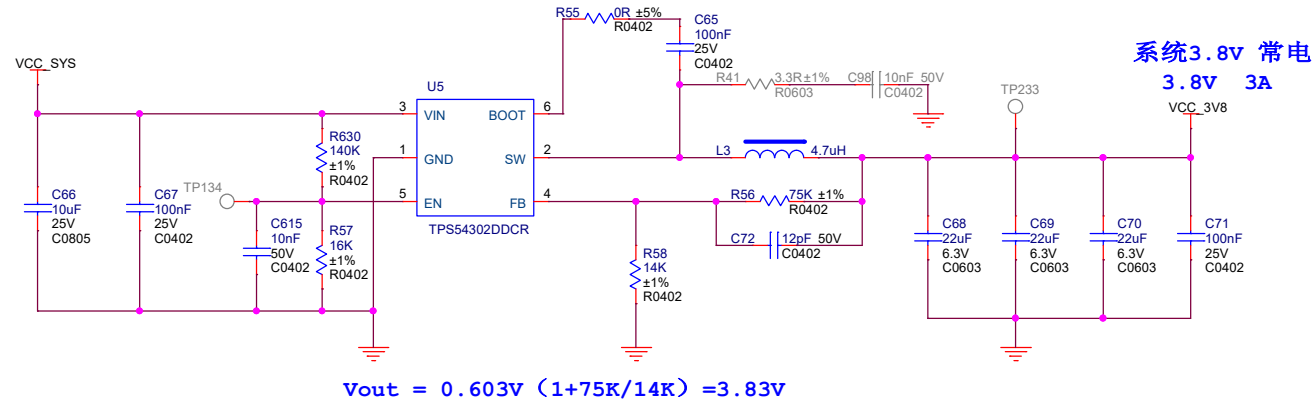


NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 00 Power Socket	Rev: V1
Part Number		Sheet 4 of 41
Modify Date	Wednesday, July 24, 2024	

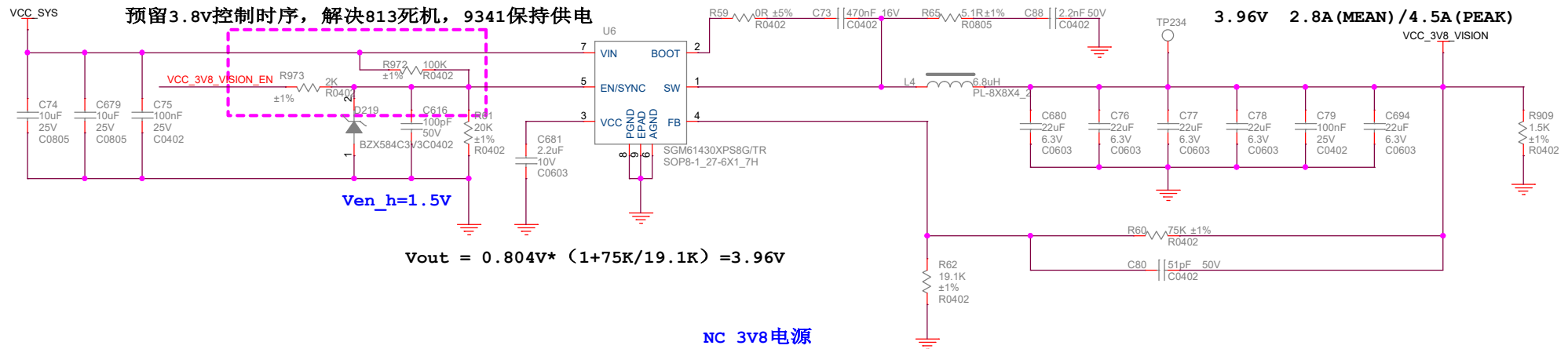


NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCB 0724A	Author: 梁伟粤
Page Size: B	Page Name: 01 Charger	Rev: V1
Part Number		Sheet 5 of 41
Modify Date	Wednesday, July 24, 2024	

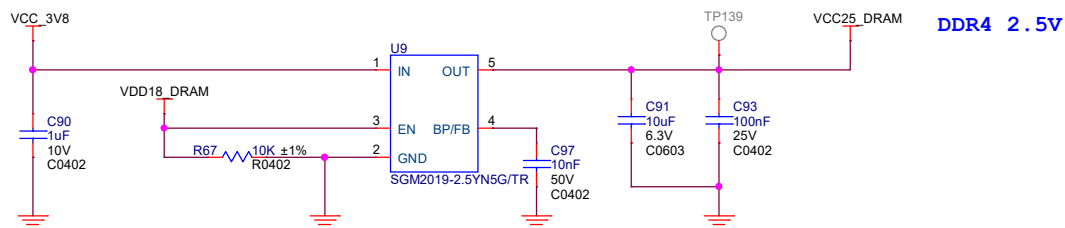
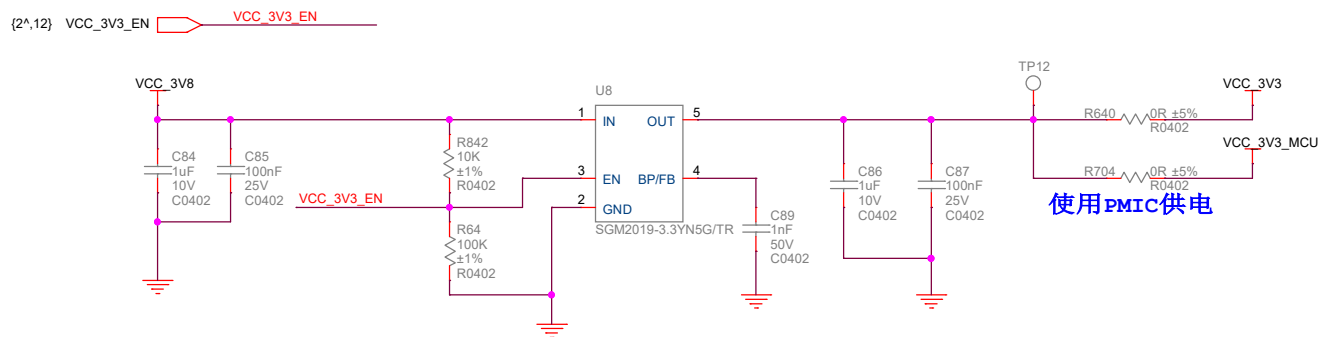
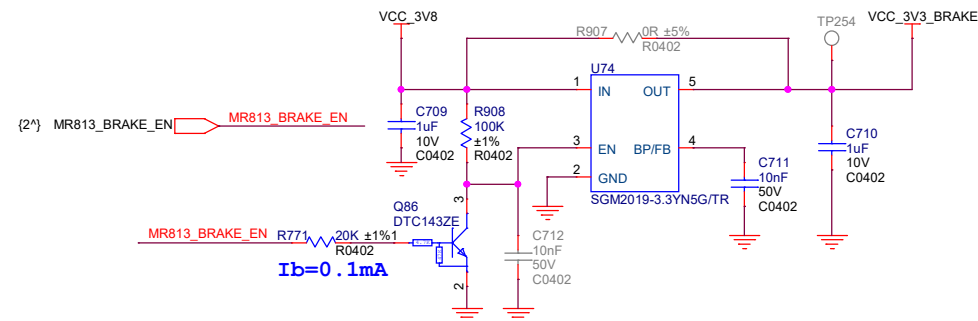
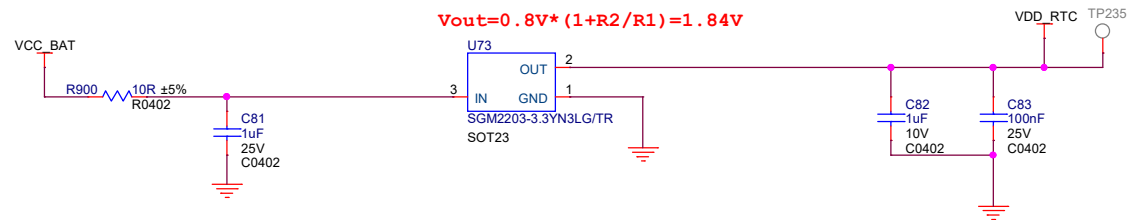
(2^,12) VCC_3V8_VISION_EN



预留3.8v控制时序，解决813死机，9341保持供电



NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 03 3V8 BUCK	Rev: V1
Part Number		Sheet 7 of 41
Modify Date	Wednesday, July 24, 2024	

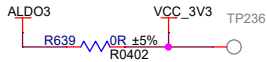


NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 04 LDO	Rev: V1
Part Number		Sheet 8 of 41
Modify Date	Wednesday, July 24, 2024	

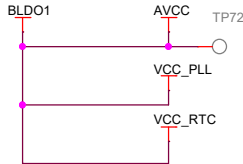
3.3V



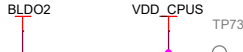
3.3V



1.8V



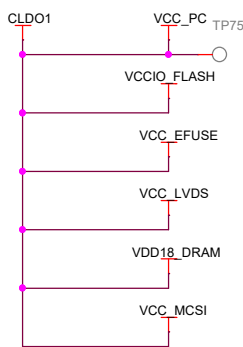
0.9V



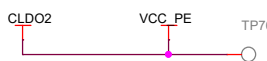
1.8V



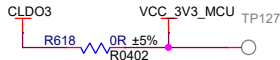
1.8V



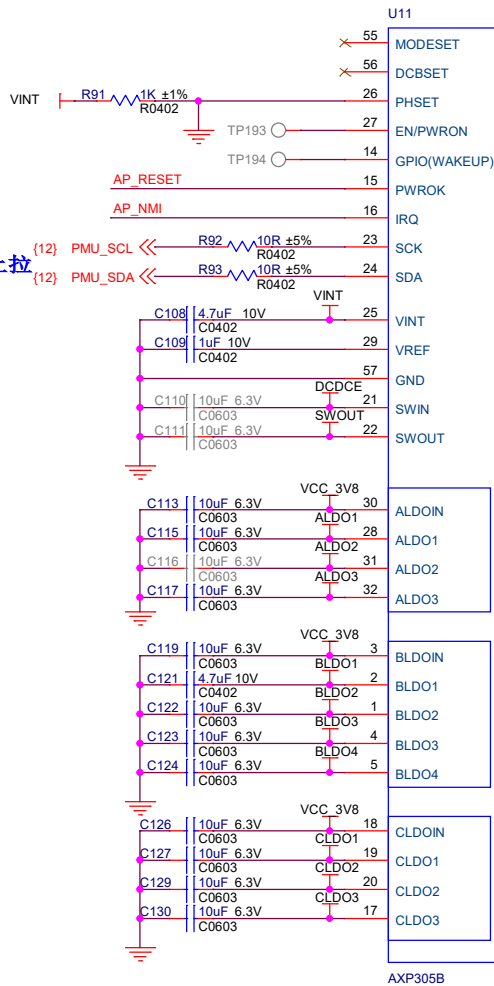
3.3V



3.3V



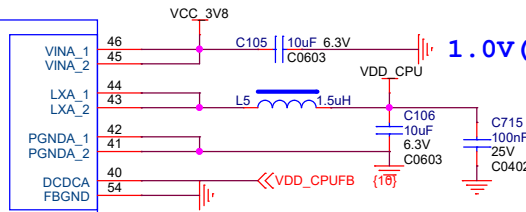
PMIC的I2C使用内置上拉



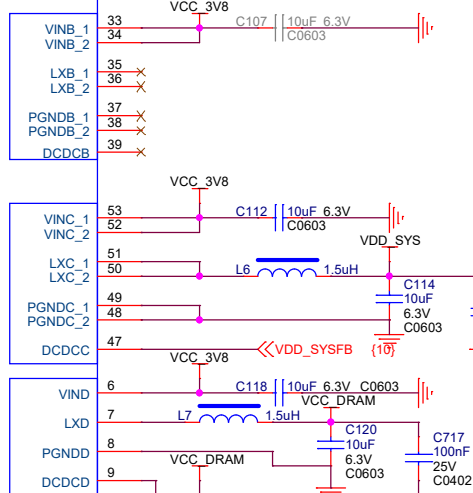
{11} AP_RESET <<

{11} AP_NMI <<

1.0V (CPU调整)



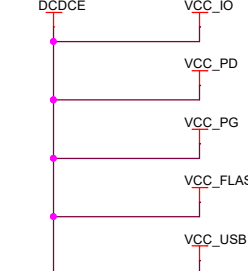
1.2V



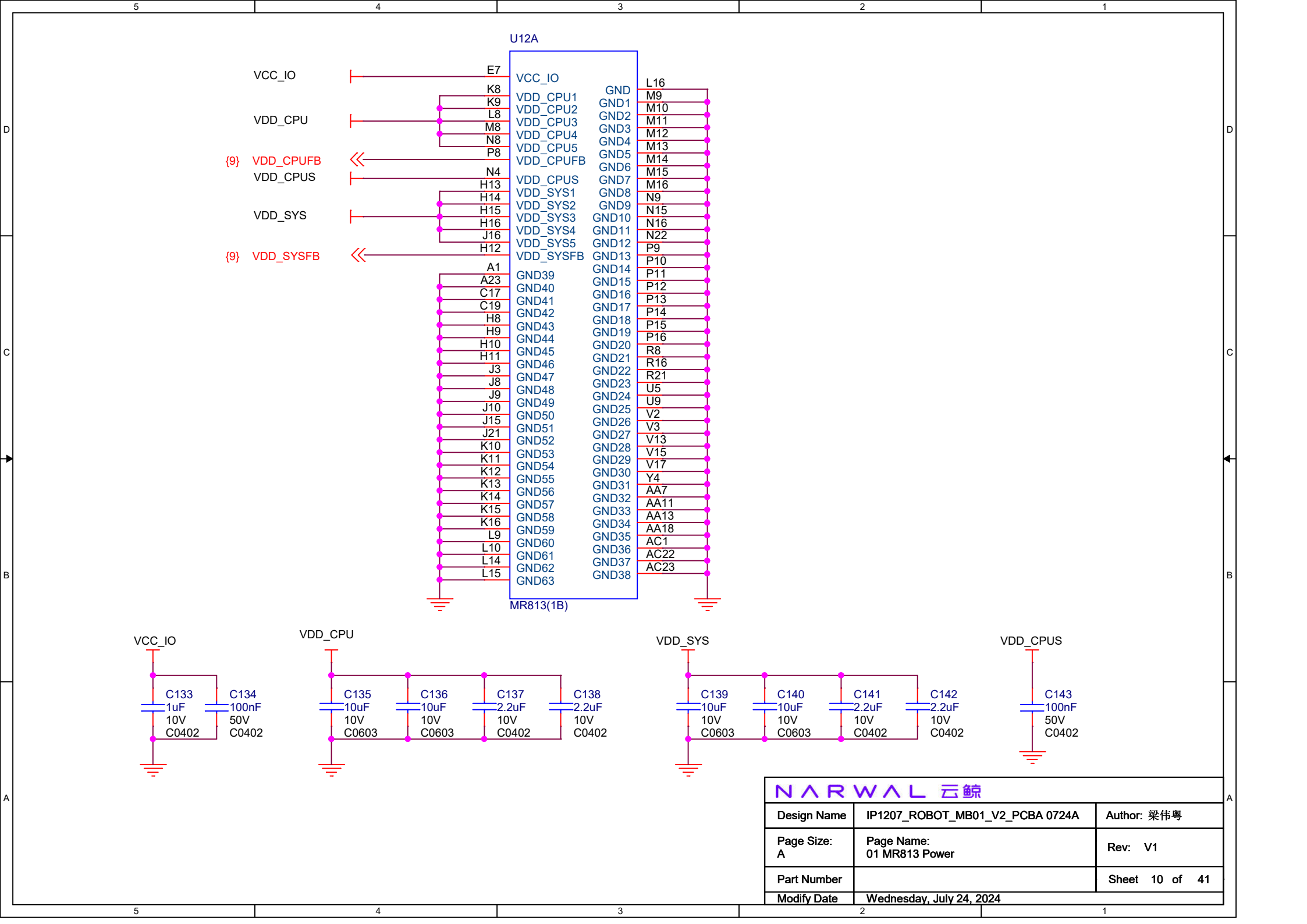
0.9V



3.3V

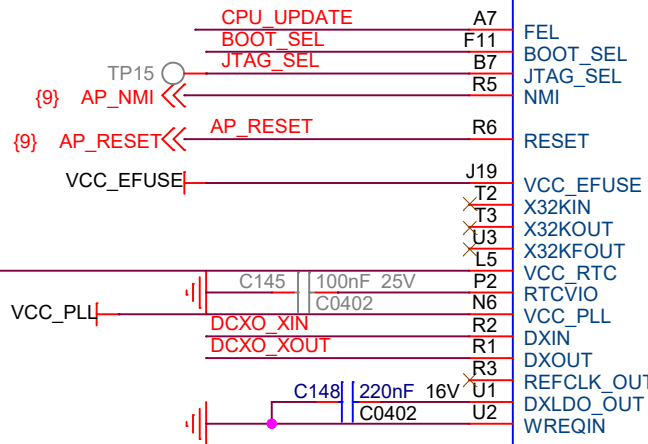
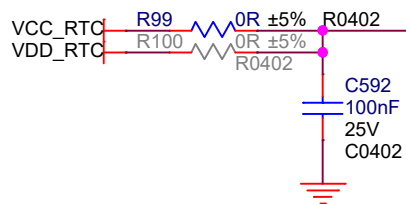


NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 00 PMIC	Rev: V1
Part Number		Sheet 9 of 41
Modify Date	Wednesday, July 24, 2024	

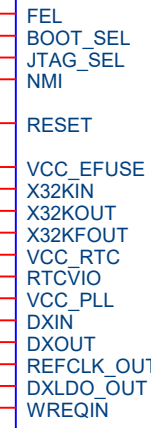


{2^,38} CPU_UPDATE CPU_UPDATE

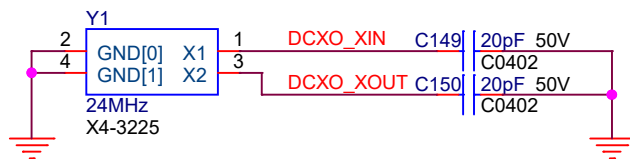
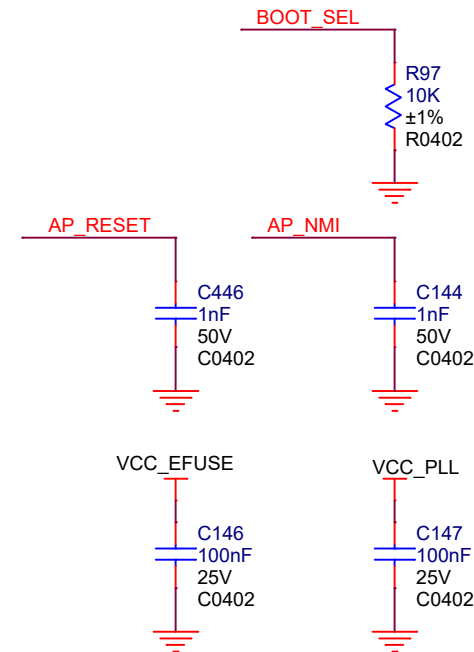
用PMIC供电



U12B

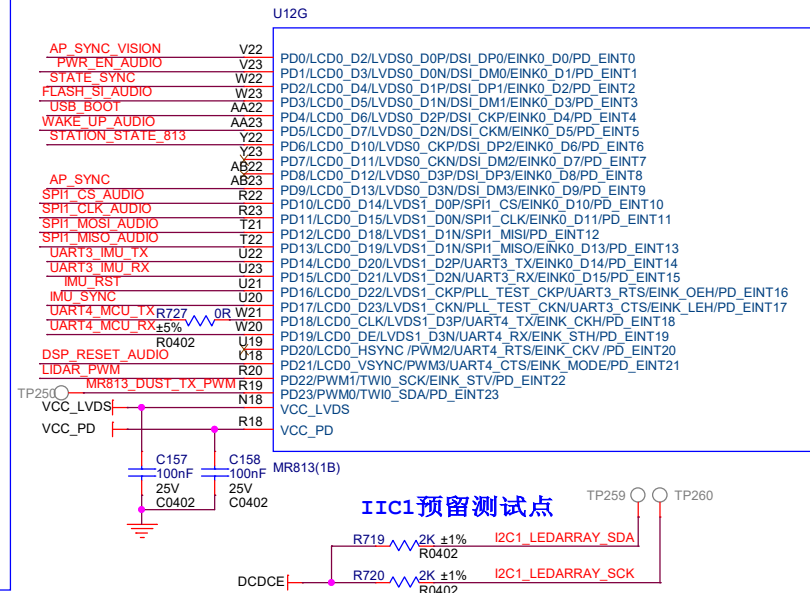
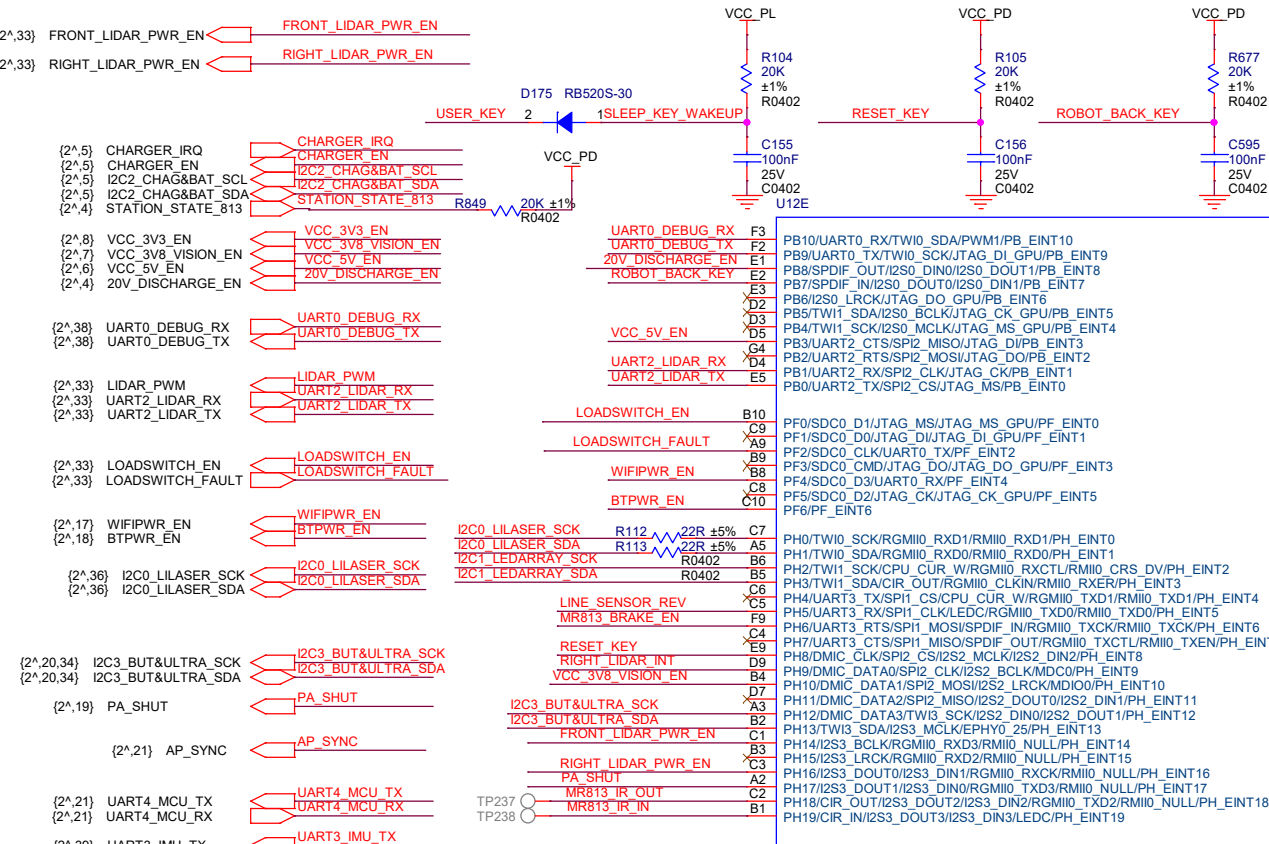
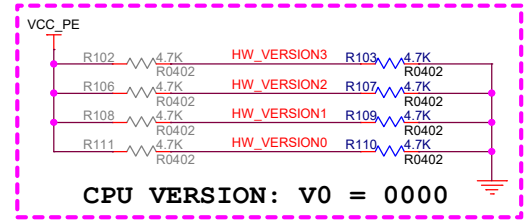
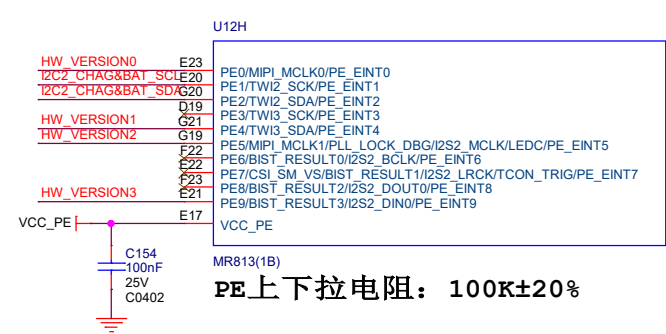
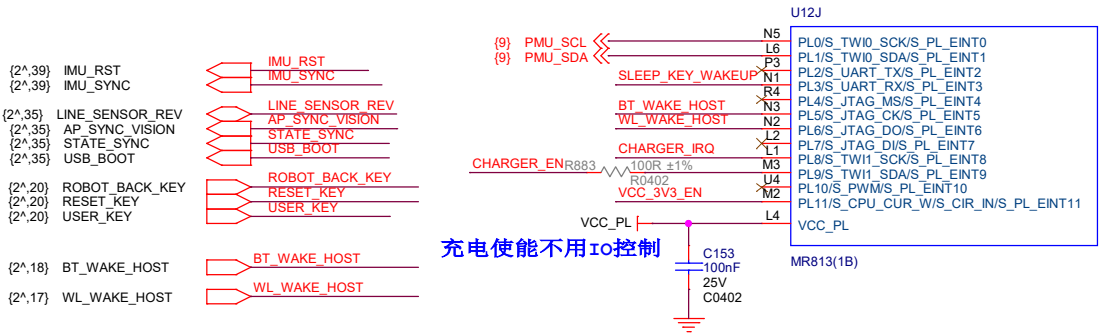


MR813(1B)

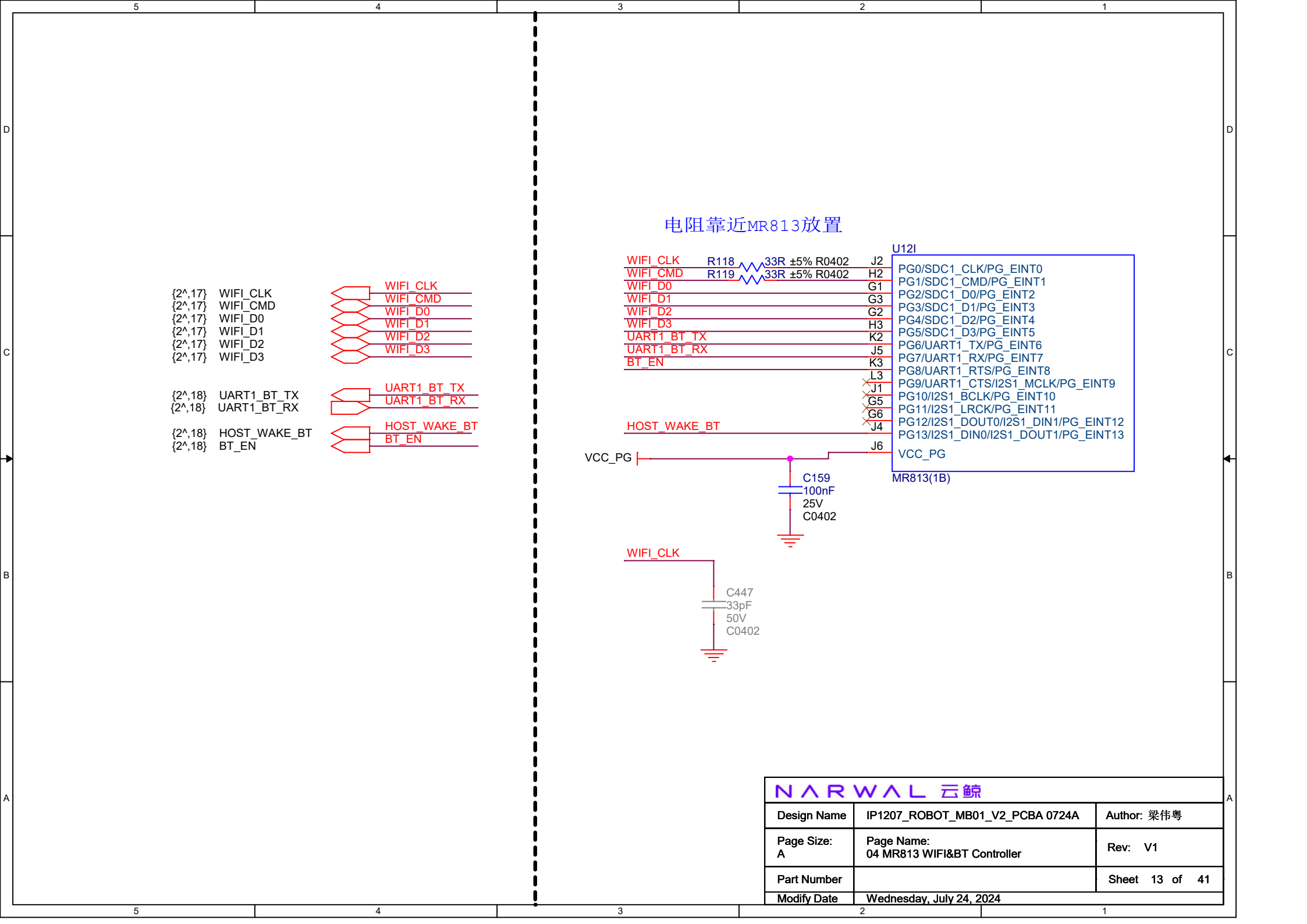


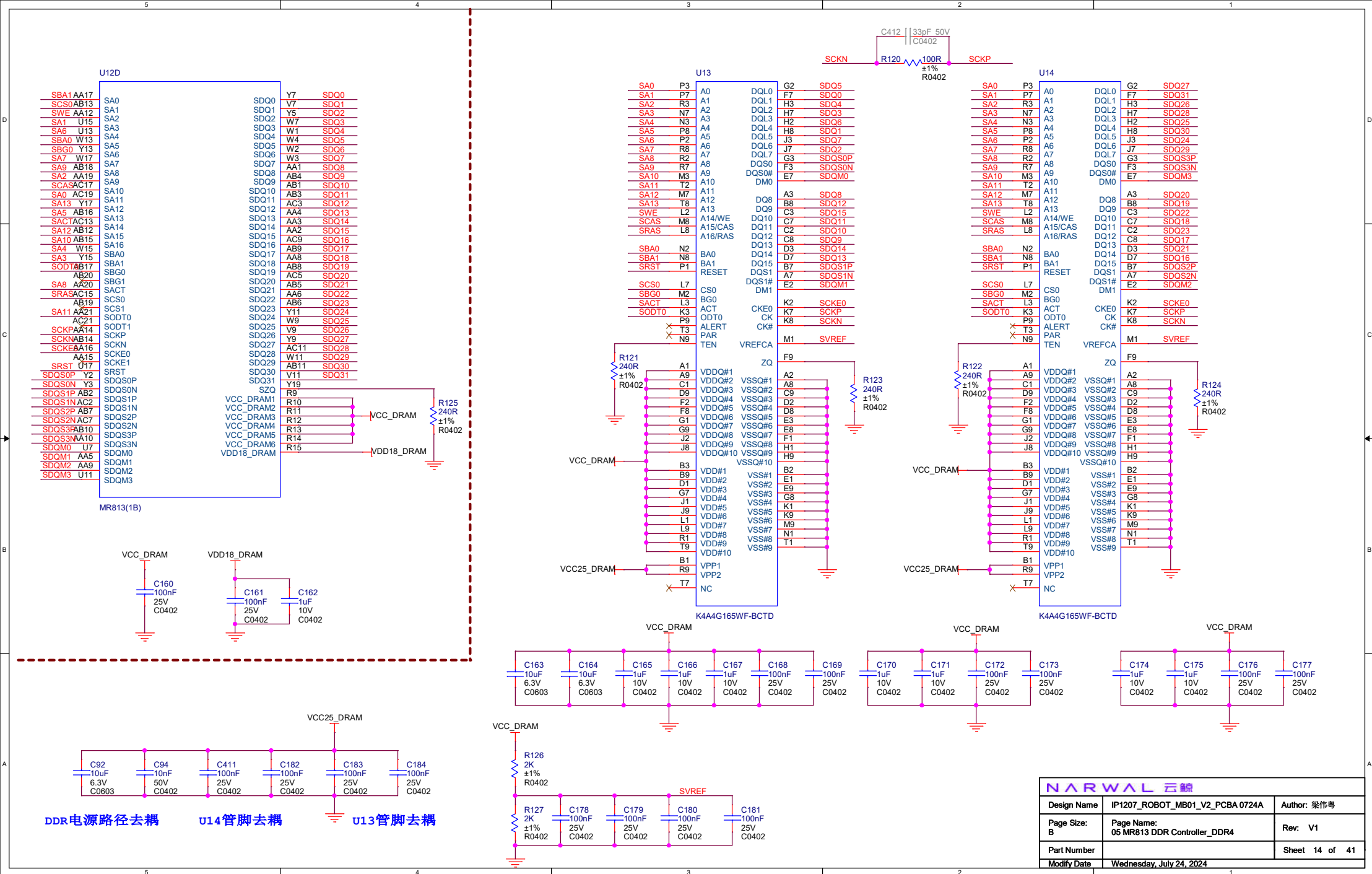
NARWAL 云鲸

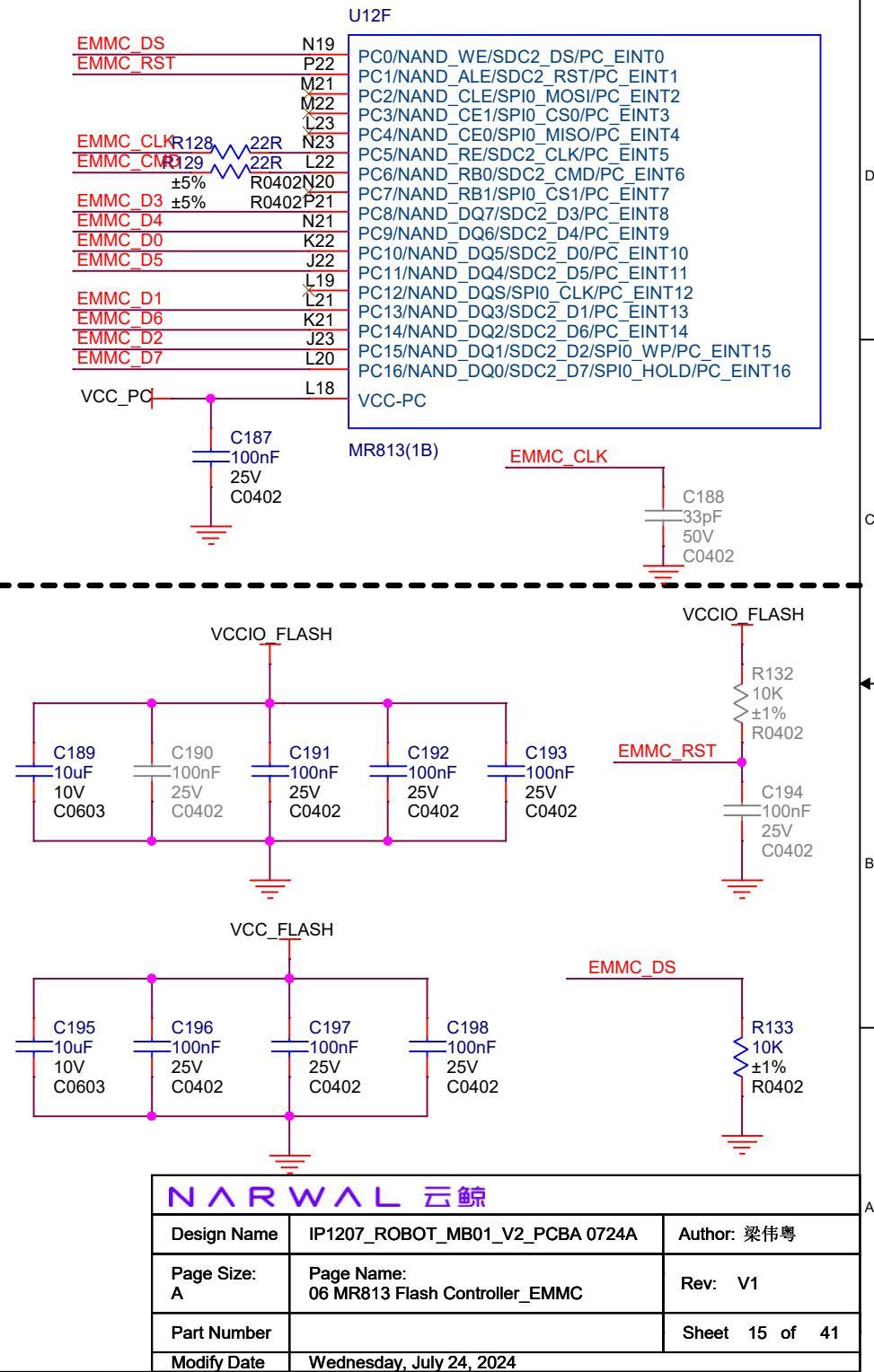
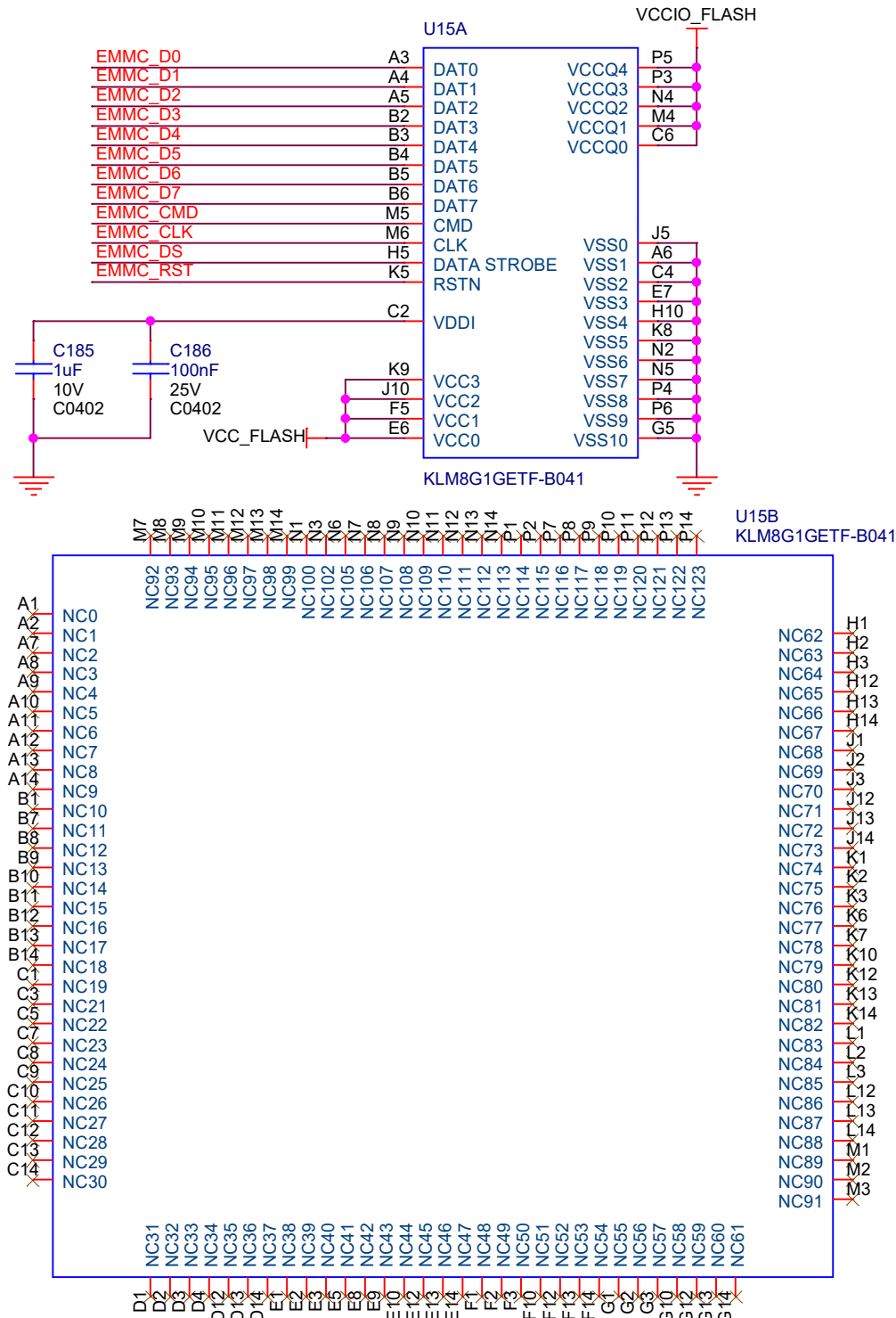
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 02 MR813 OSC	Rev: V1
Part Number		Sheet 11 of 41
Modify Date	Wednesday, July 24, 2024	

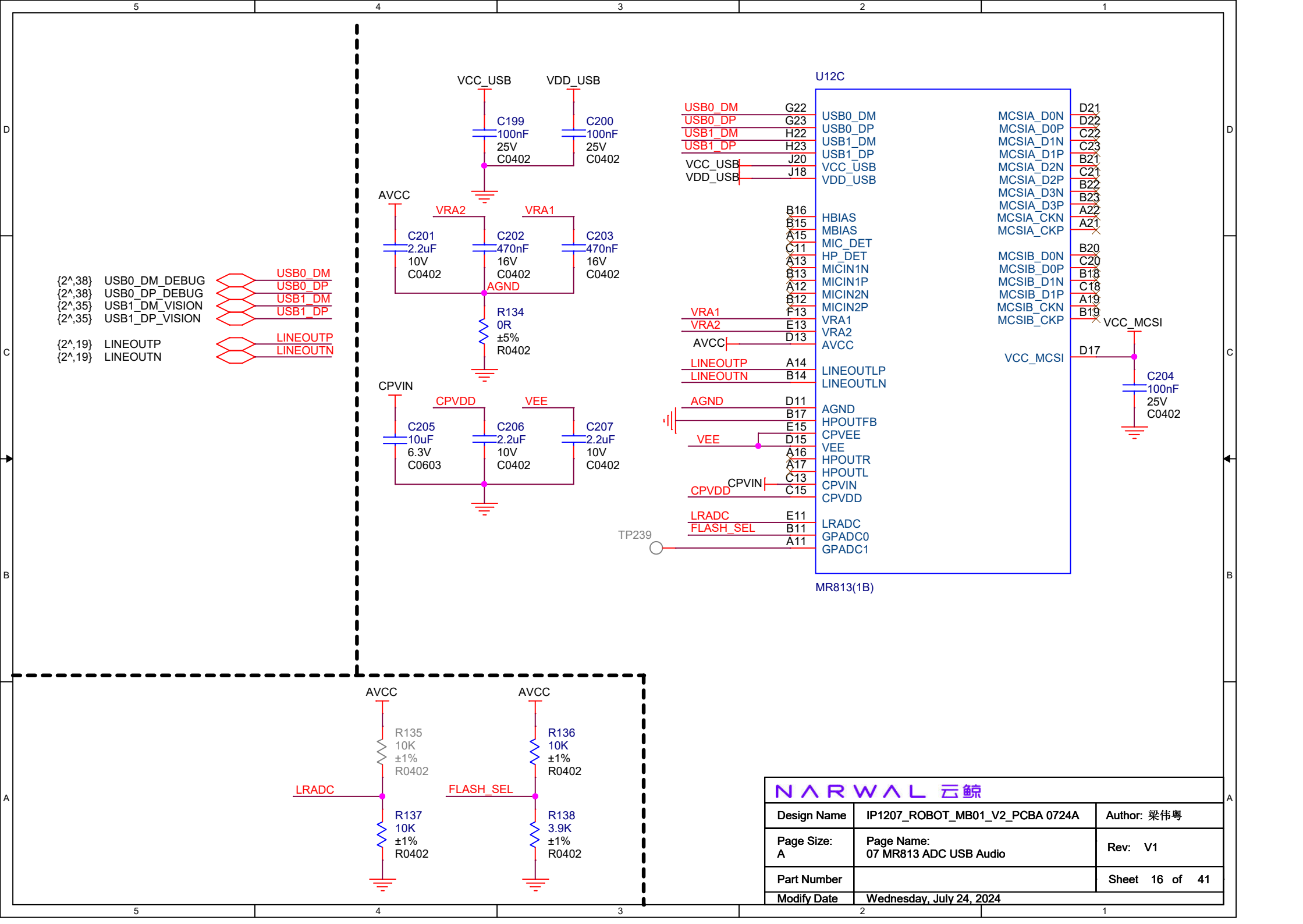


NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 03 MR813 Peripherals	Rev: V1
Part Number		Sheet 12 of 41
Modify Date	Wednesday, July 24, 2024	



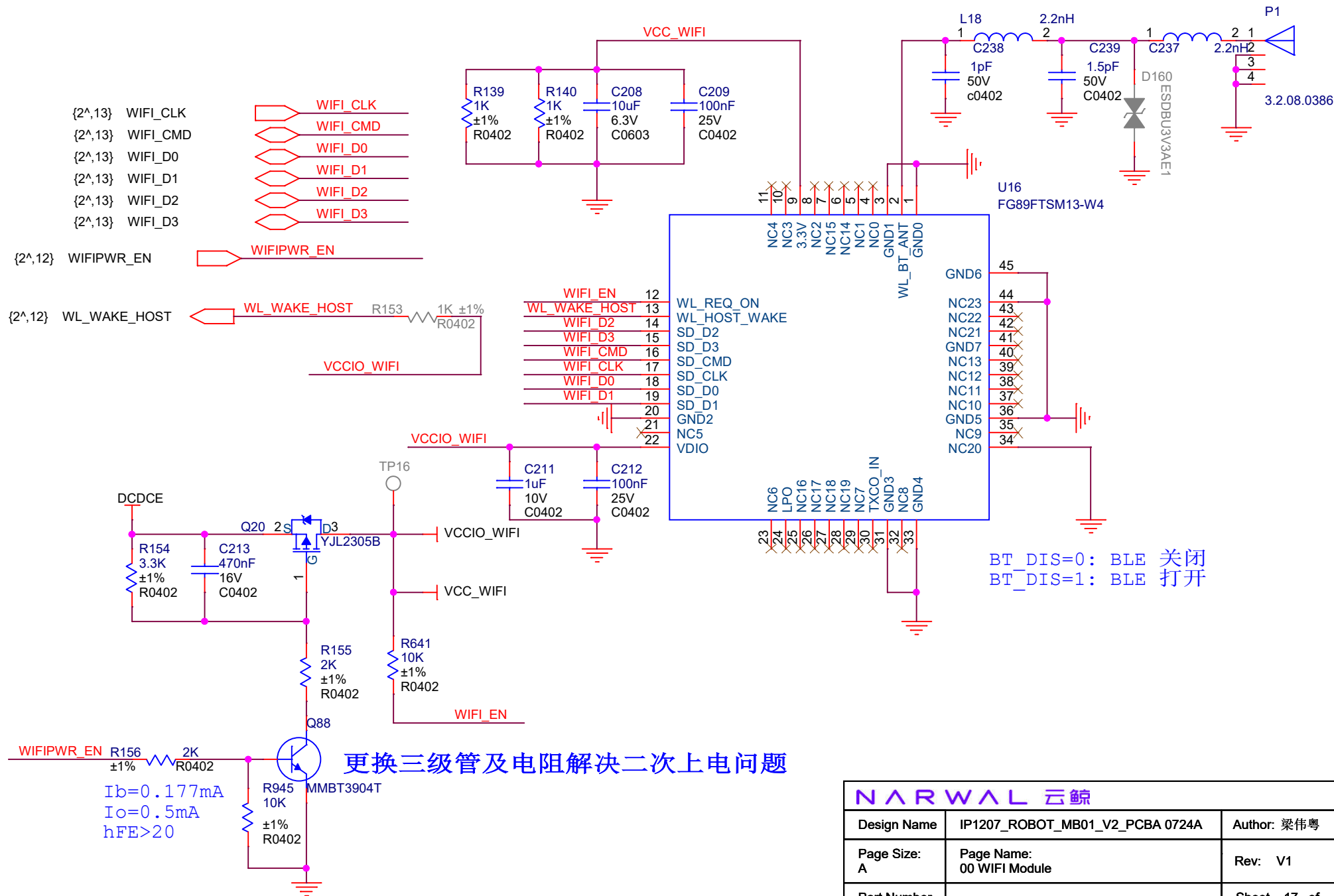






SDIO

WIFI射频座子



NARWAL 云鲸

Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 00 WIFI Module	Rev: V1
Part Number		Sheet 17 of 41
Modifv Date	Wednesday, July 24, 2024	

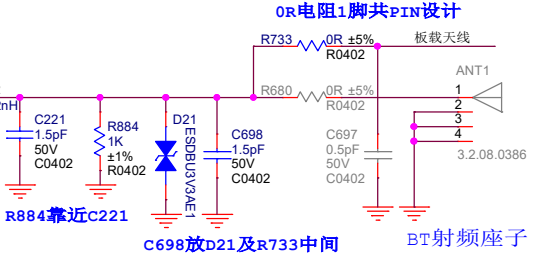
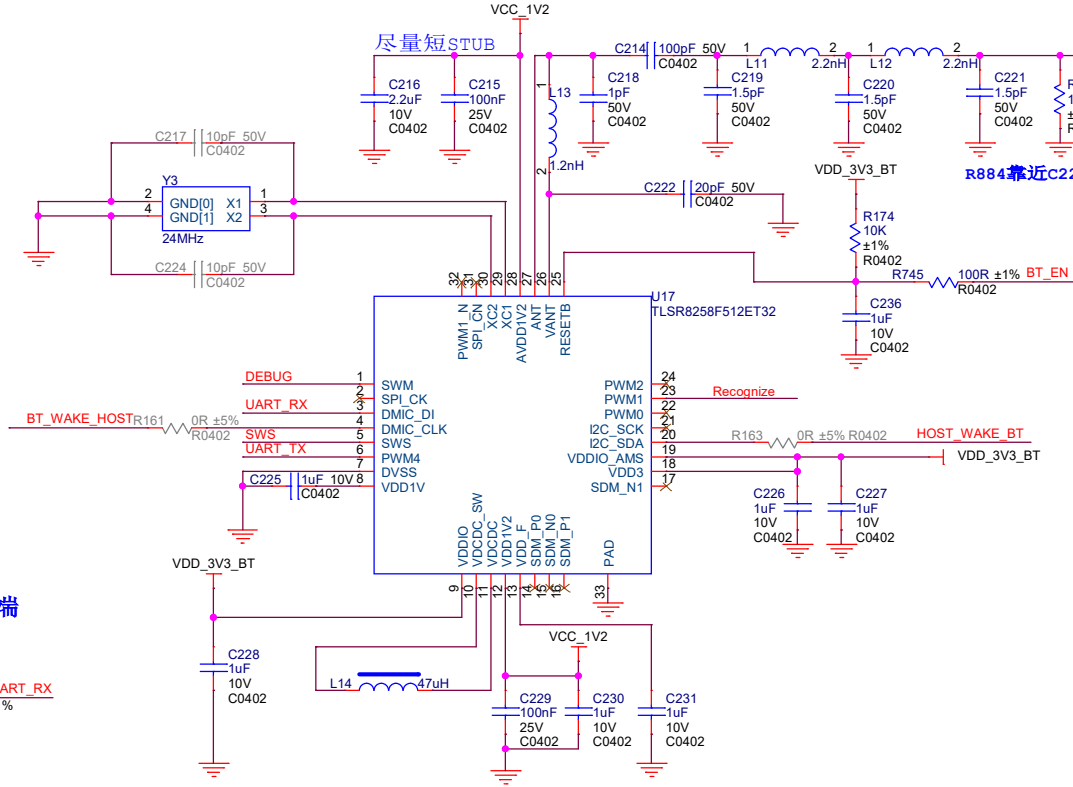
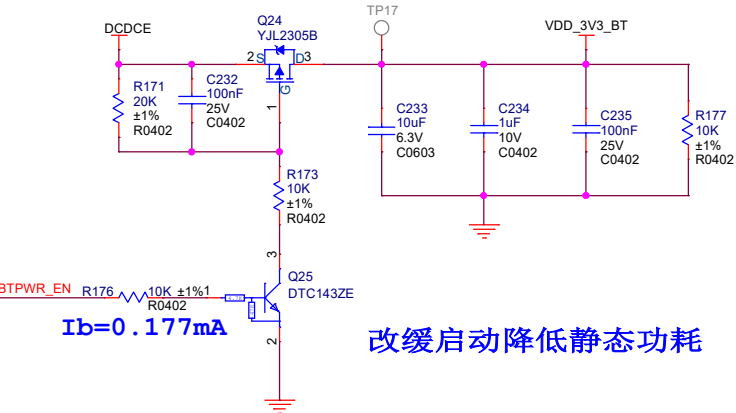
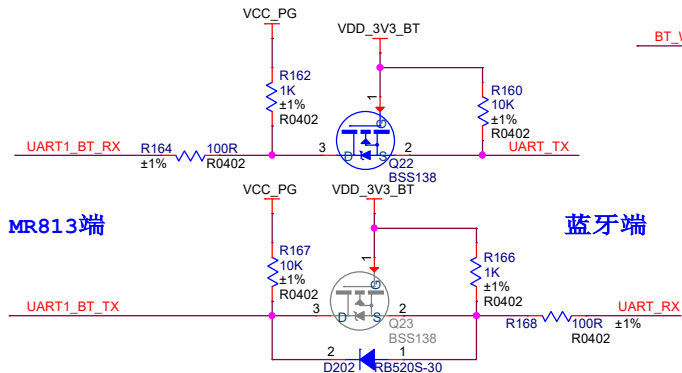
{2^,38} DEBUG
{2^,38} SWS
{2^,13} BT_EN
{2^,13} UART1_BT_TX
{2^,13} UART1_BT_RX

{2^,13} HOST_WAKE_BT
{2^,12} BT_WAKE_HOST

{2^,12} BTPWR_EN

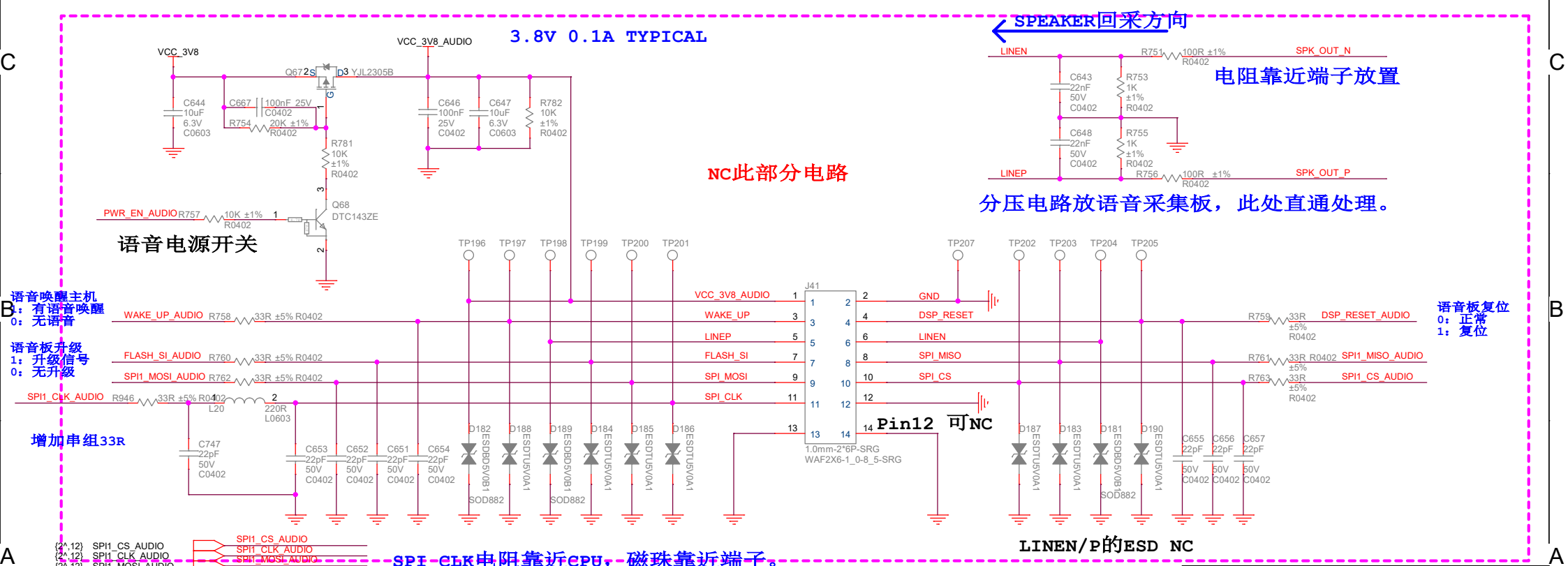
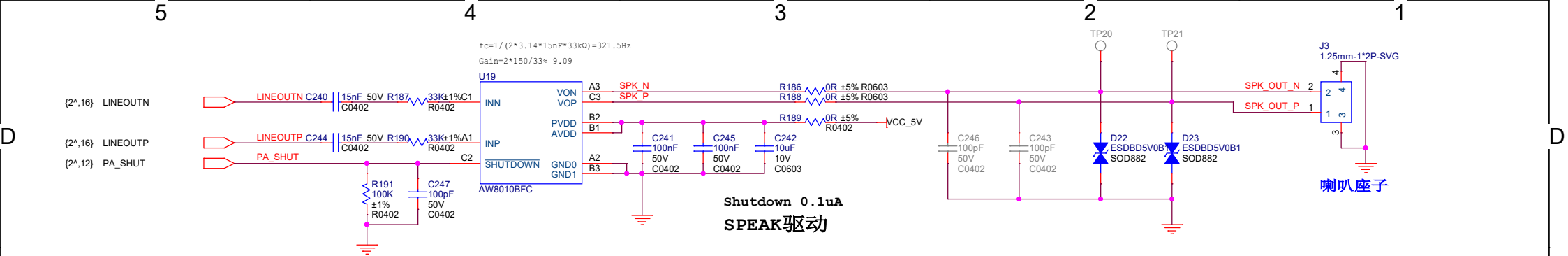
{2^,38} BT_DEBUG_RX
{2^,38} BT_DEBUG_TX

靠近BT模组，测试信号质量时去掉防止STUB



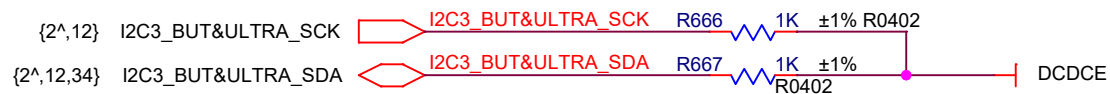
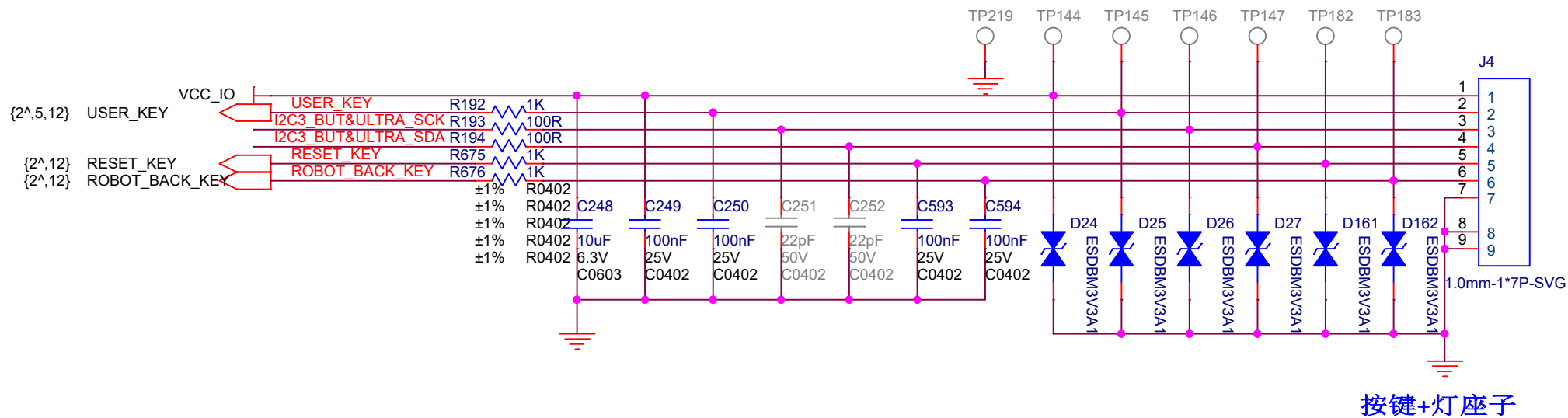
蓝牙电源关闭，MOSFET关闭，防倒灌
蓝牙电源打开，
UART_TX=0，Q22打开，UART_BT_RX=0
UART_TX=1，Q22关闭，UART_BT_RX被R162上拉到1
蓝牙电源打开，
UART_BT_TX=1，Q22关闭，UART_RX被R166上拉到1
UART_BT_TX=0，Q22关闭，UART_RX被Q23二极管拉到低

NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 01 BT Module	Rev: V1
Part Number		Sheet 18 of 41
Modify Date	Wednesday, July 24, 2024	

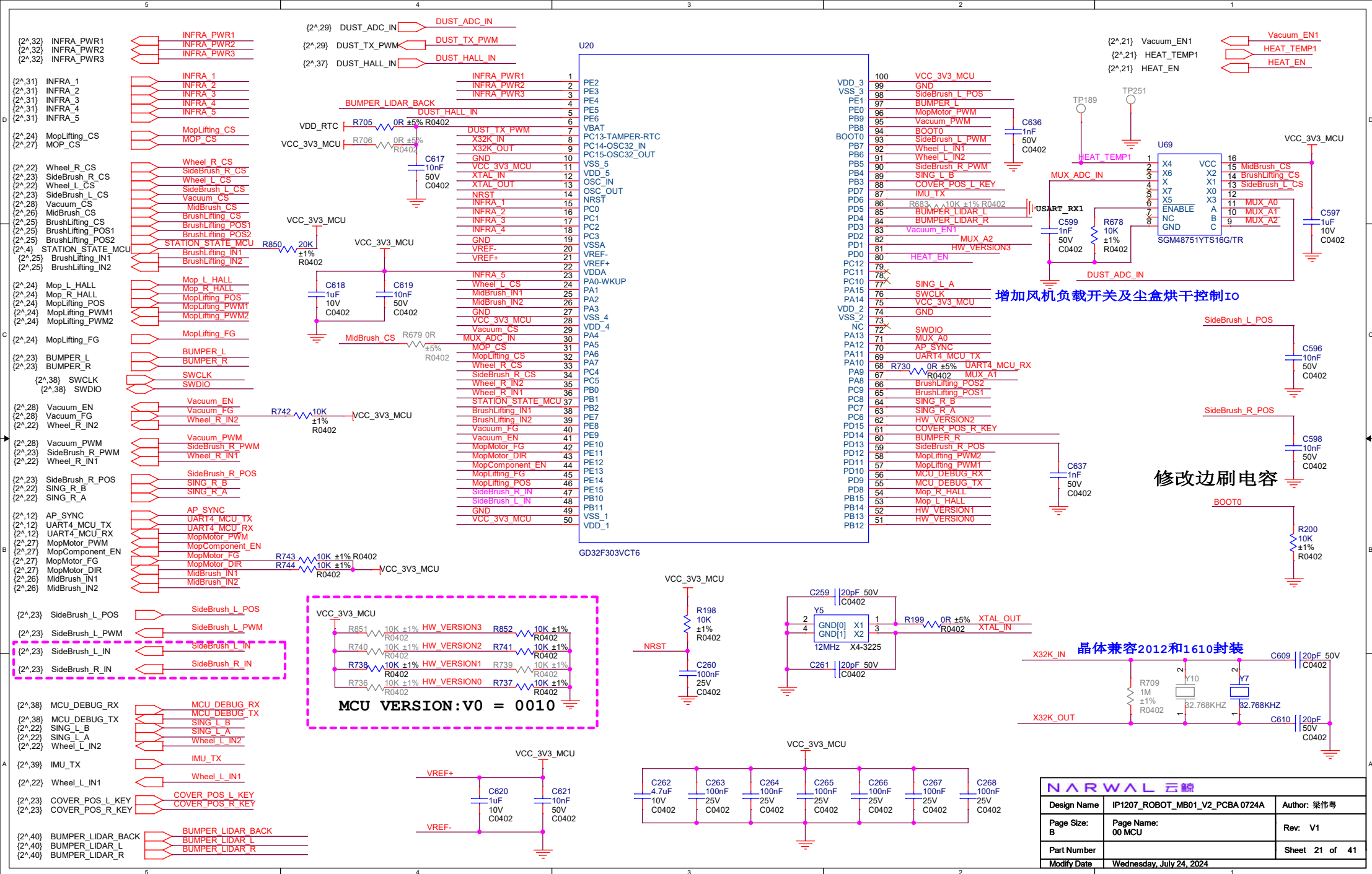


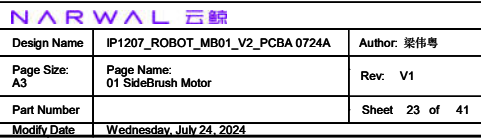
5 4 3 2 1

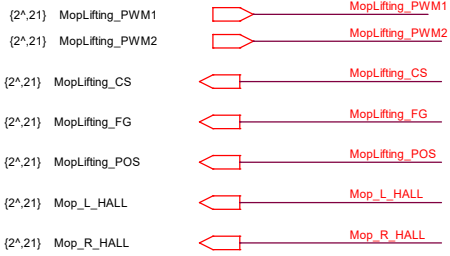
NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 01 Audio	Rev: V1
Part Number		Sheet 19 of 41
Modify Date	Wednesday, July 24, 2024	



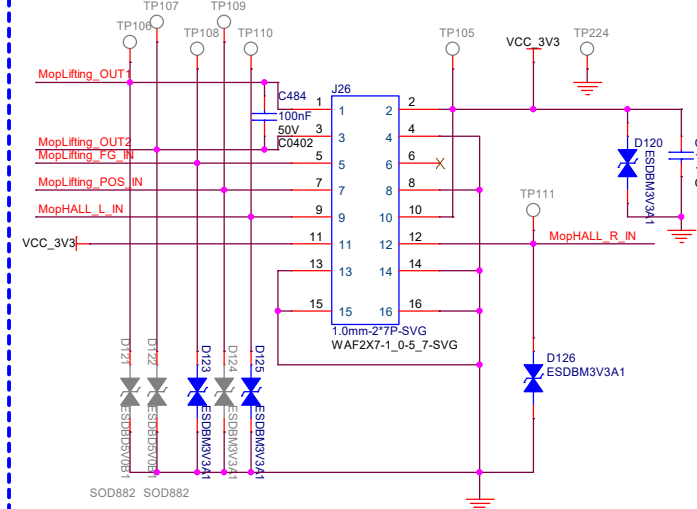
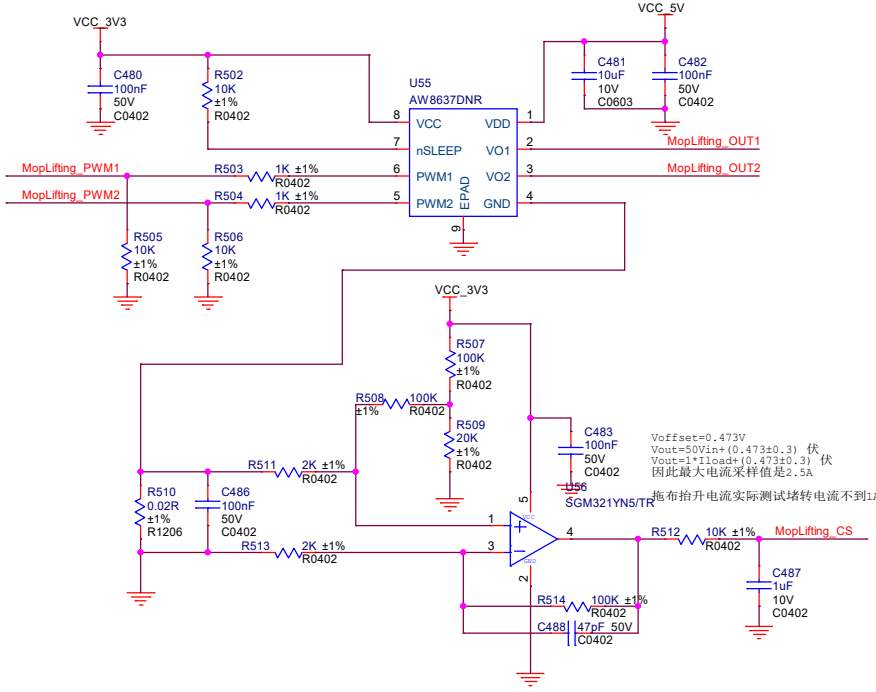
NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 02 KEY_LED	Rev: V1
Part Number		Sheet 20 of 41
Modify Date	Wednesday, July 24, 2024	



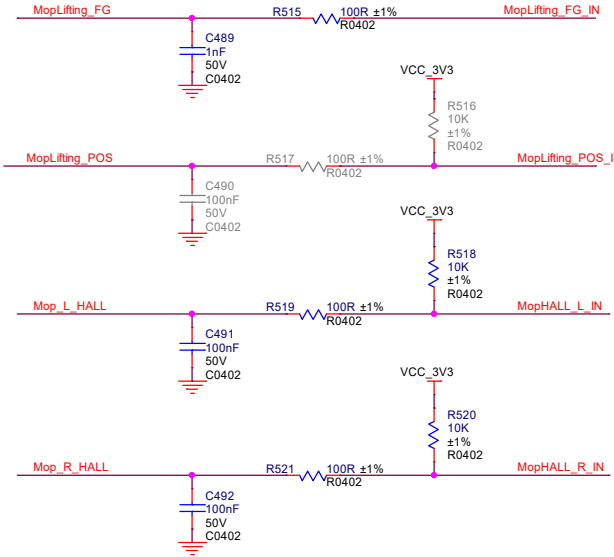




CS是电流采样
FG是拖布抬升圈数
SW是拖布抬升到位



拖布抬升



NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A3	Page Name: 02 MopLifting Component	Rev: V1
Part Number		Sheet 24 of 41
Modify Date	Wednesday, July 24, 2024	

{2^,21} BrushLifting_IN1
{2^,21} BrushLifting_IN2

{2^,21} BrushLifting_CS
{2^,21} BrushLifting_POS1
{2^,21} BrushLifting_POS2

BrushLifting_IN1

BrushLifting_IN2

BrushLifting_CS

BrushLifting_POS1

BrushLifting_POS2

BrushLifting_POS_IN2

BrushLifting_POS_IN1

BrushLifting_OUT2

BrushLifting_OUT1

J27
1.25mm-1*5P-SVG
WAF5-1_25-4_2-SVG

NC滚刷抬升

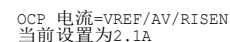
Voffset=0.473V
Vout=50Vin+ (0.473±0.3) 伏
Vout=1*Iload+ (0.473±0.3) 伏
因此最大电流采样值是2.5A

滚刷抬升电流实际测试堵转电流不到1A

NARWAL 云鲸

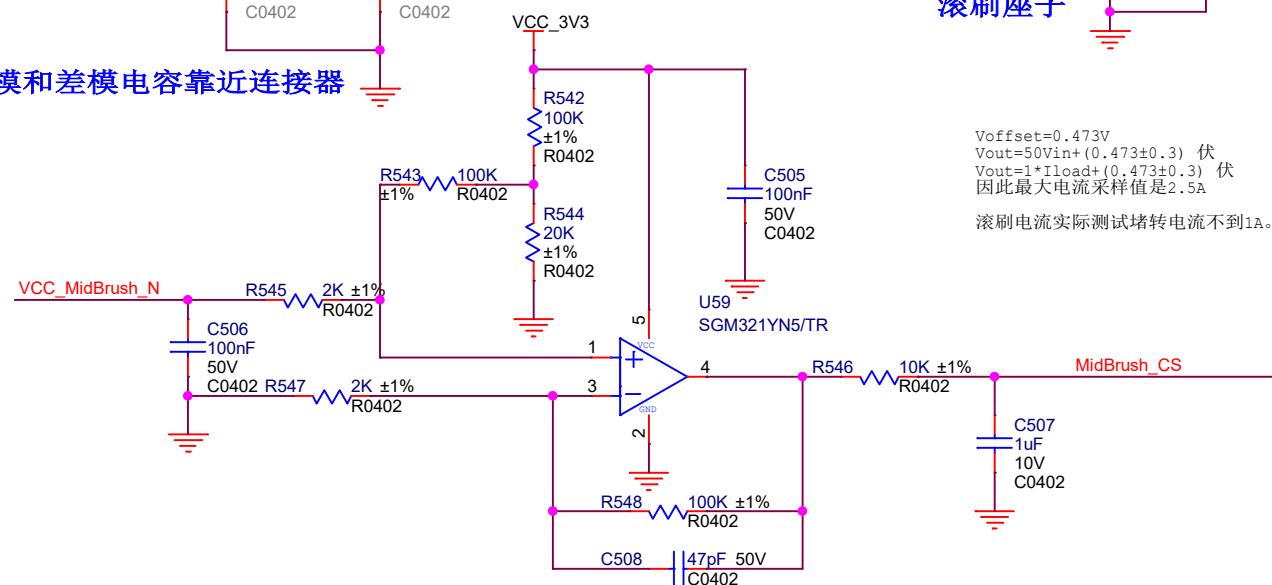
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A4	Page Name: 03 MidBrushLifting Motor	Rev: V1
Part Number		Sheet 25 of 41
Modify Date	Wednesday, July 24, 2024	

AMP 组件NC

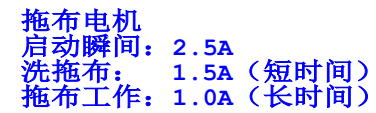
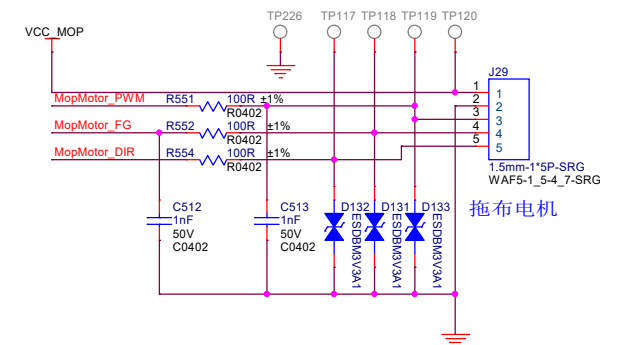


Voffset=0.473V
 $V_{out}=50V_{in}+(0.473\pm0.3)$ 伏
 $V_{out}=1*I_{load}+(0.473\pm0.3)$ 伏
 因此最大电流采样值是2.5A

滚刷电流实际测试堵转电流不到1A。规格书2.1A

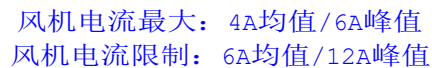
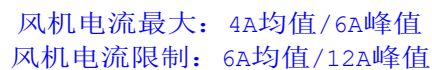


NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A4	Page Name: 04 MidBrush Motor	Rev: V1
Part Number		Sheet 26 of 41
Modify Date	Wednesday, July 24, 2024	



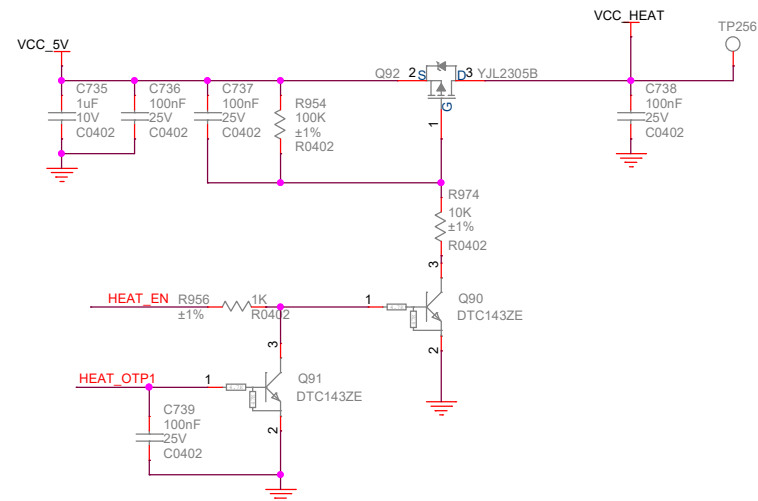
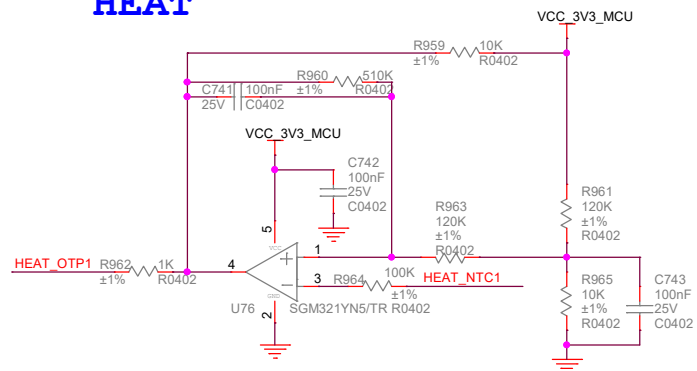
{2^A,21}	MopMotor_PWM		MopMotor_PWM
{2^A,21}	MopMotor_DIR		MopMotor_DIR
{2^A,21}	MopMotor_FG		MopMotor_FG
{2^A,21}	MOP_CS		MOP_CS
{2^A,21}	MopComponent_EN		MopComponent_EN

		
Design Name	IP1207_ROBOT_MB01_V2_PCB A 0724A	Author: 梁伟粤
Page Size: A5 Mop Motor	Page Name: 05 Mop Motor	Rev: V1
Part Number		Sheet 27 of 41
Modify Date	Wednesday, July 24, 2024	

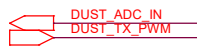


NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCB A 0724A	Author: 梁伟粤
Page Size: A3	Page Name: 06 Vacuum Component	Rev: V1
Part Number		Sheet 28 of 41
Modify Date	Wednesday, July 24, 2024	

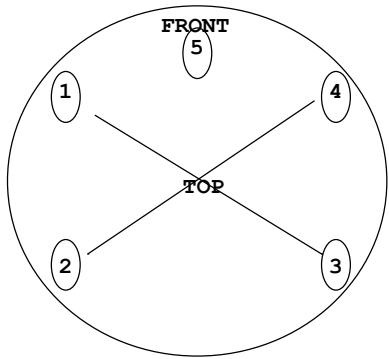
VCC_3V3_MCU



NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCB A 0724A	Author: 梁伟粤
Page Size: B	Page Name: 07 Heat&Temperature &humidit	Rev: V1
Part Number		Sheet 29 of 41
Modify Date	Wednesday, July 24, 2024	

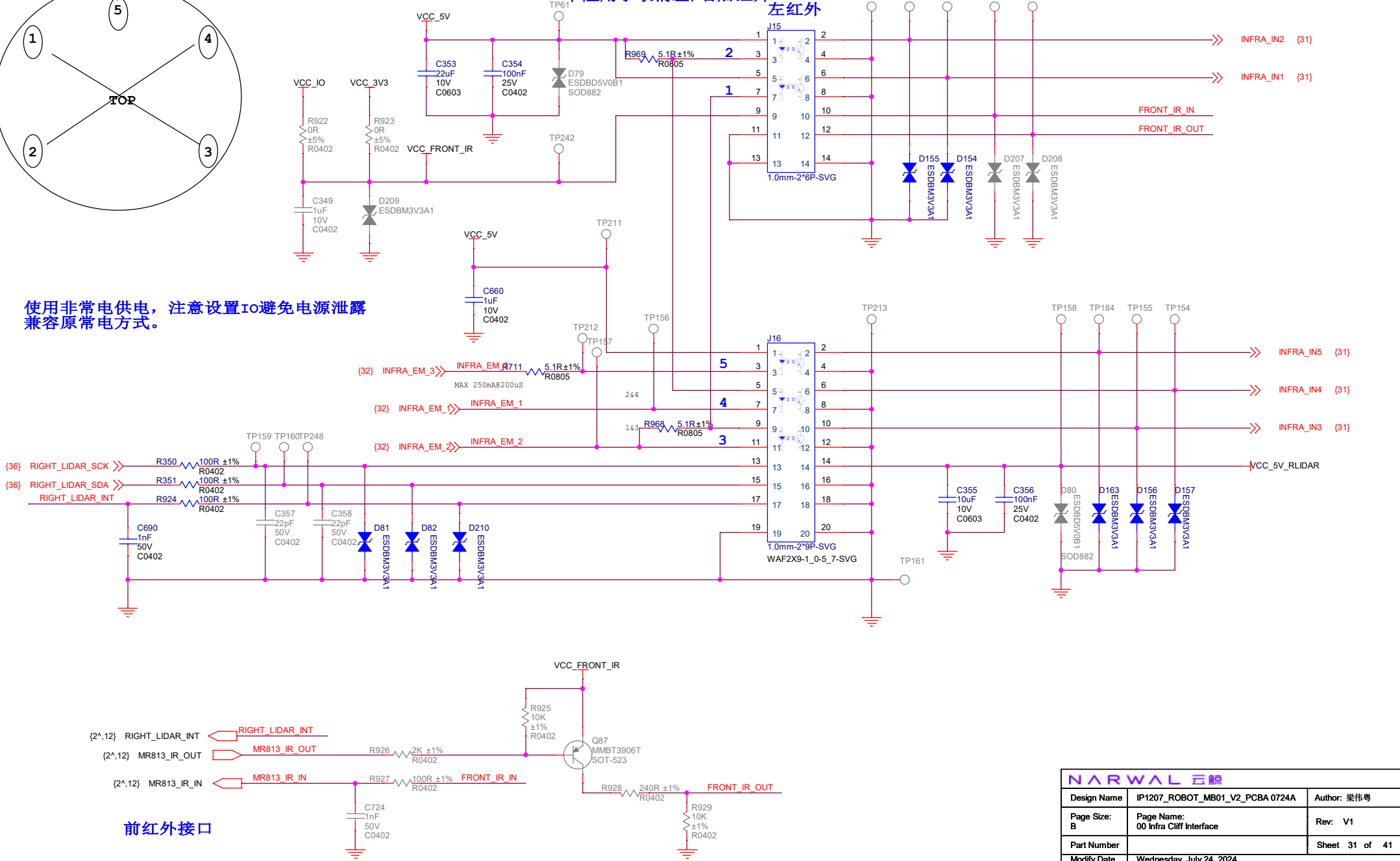


NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCB 0724A	Author: 梁伟粤
Page Size: B	Page Name: 00 DUST_COVER	Rev: V1
Part Number		Sheet 30 of 41
Modify Date	Wednesday, July 24, 2024	



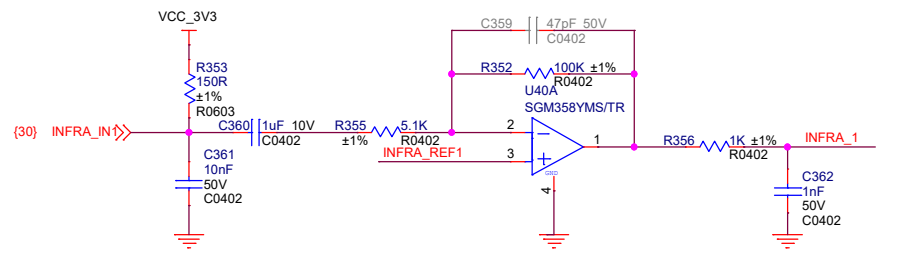
使用非常电供电，注意设置IO避免电源泄露
兼容原常电方式。

串阻用于取消左/右后红外
左红外

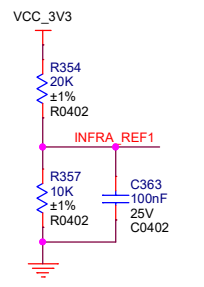


前红外接口

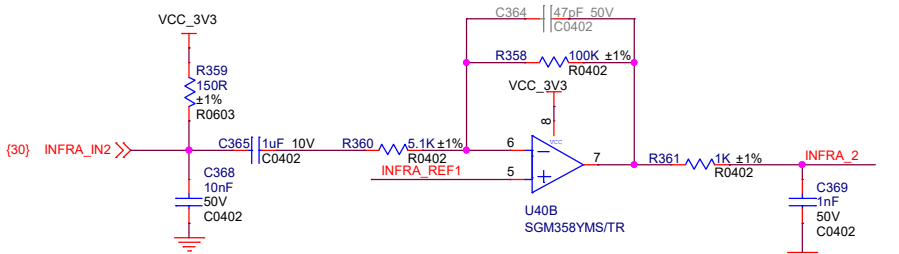
NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 00 Infra Cliff Interface	Rev: V1
Part Number		Sheet 31 of 41
Modify Date	Wednesday, July 24, 2024	



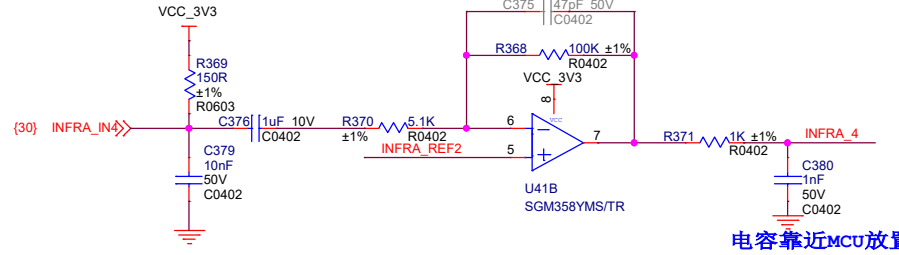
电容靠近MCU放置



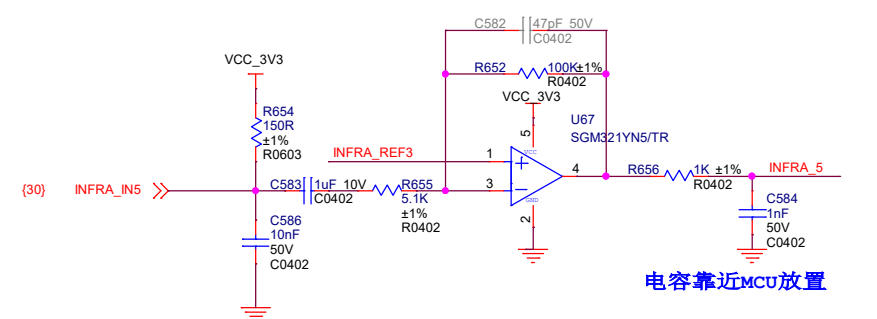
电容靠近MCU放置



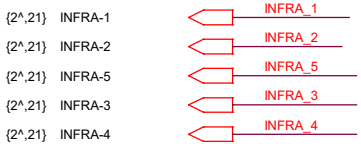
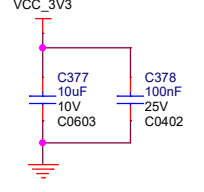
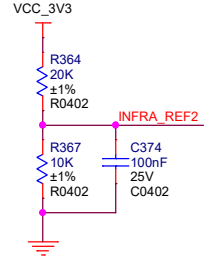
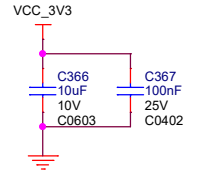
电容靠近MCU放置



电容靠近MCU放置

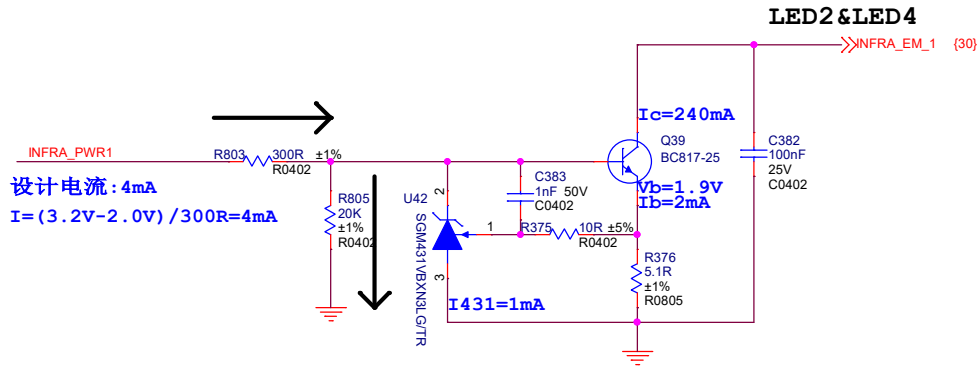


电容靠近MCU放置

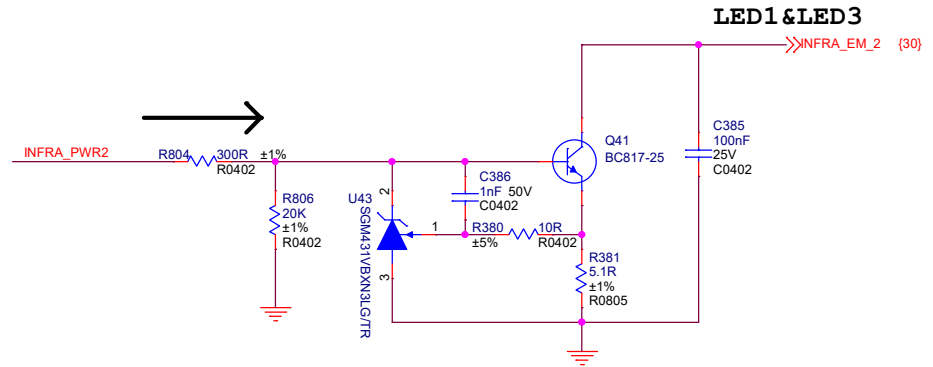


NARVAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 01 Infra Cliff RX	Rev: V1
Part Number		Sheet 32 of 41
Modify Date	Wednesday, July 24, 2024	

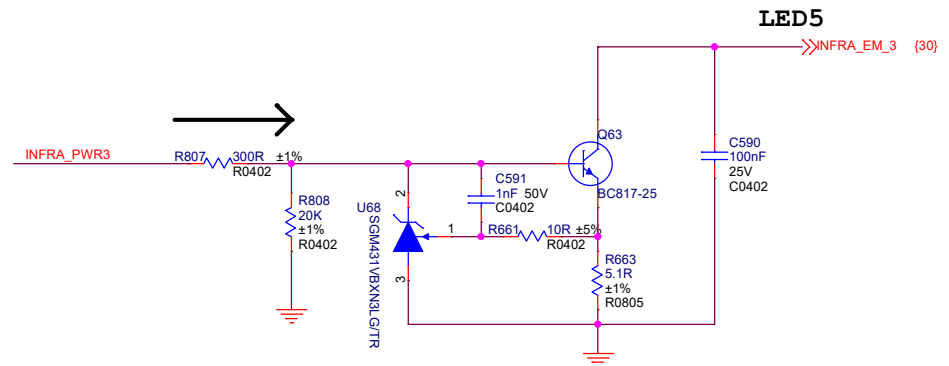
IO驱动能力: 8mA/20mA



SGM431稳压电流范围: 0.1mA~70mA IO电流需求: 2.15mA
TL432稳压电流范围: 1mA~100mA IO电流需求: 3.05mA
恒流源驱动: $I = V_{ref} / R = 1.25V / 5.1R = 245mA$



恒流源驱动: $I = V_{ref} / R = 1.25V / 5.1R = 245mA$



恒流源驱动: $I = V_{ref} / R = 1.25V / 5.1R = 245mA$

NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 02 Infra Cliff TX	Rev: V1
Part Number		Sheet 33 of 41
Modify Date	Wednesday, July 24, 2024	

起升 5V 10mA

按键及点阵LED 5V 500mA MAX

VCC_5V
VCC_5V_SENSOR

VCC_PD

R382 10K ±1%
R384 1K ±1%
R386 10K ±1%

C389 10μF 10V
C390 100nF 25V

LOADSWITCH_FAULT
LOADSWITCH_EN

R383 68K ±1%

C387 10μF 10V
C392 25V

R930 1.5K ±1%

VCC_5V_LIDAR

U44
TPS2522-1BVR

IN OUT
FAULT ILIM
EN GND

C388 100nF 25V

$I_{OS} \text{ (mA)} = 55960 \text{ (V)} / R_{ilim} \cdot 1.00$

$$I_{os}(\text{mA}) = 55960 \text{ (V)} / R_{ilim}^{1.004} \text{ (k)} = 822 \text{ mA}$$
[illegible]

The schematic diagram illustrates the power supply and signal input section of the RLIDAR module. It features a VCC_5V supply connected to a 5V regulator (U1) and a 5V signal input (Q70). The regulator is powered by a 5V supply and has a feedback network with R813 and R402. The signal input is connected to a 5V supply and has a feedback network with R832 and R402. The signal input is also connected to a 5V supply and has a feedback network with R832 and R402.

The schematic diagram illustrates the electrical connections for the LiDAR module, consisting of a main board and two daughter boards.

Main Board Components:

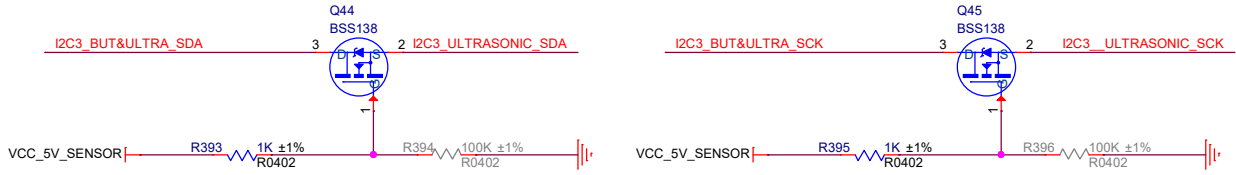
- Power Regulation:** A 5V regulator (C393, C394, C402) provides power to the module.
- Signal Interface:** A 1.25mm pitch SRG connector (J18) provides the primary signal interface.
- LEDs:** Four LEDs (D83, D84, D85, D86) are connected to the main board.
- Resistors:** Various resistors (R386, R387, R388, R395, R396, R397, R402) are used for current limiting and signal conditioning.
- Capacitors:** Decoupling capacitors (C395, C396, C397, C402) are used to filter noise from the power supply.

Daughter Board Components:

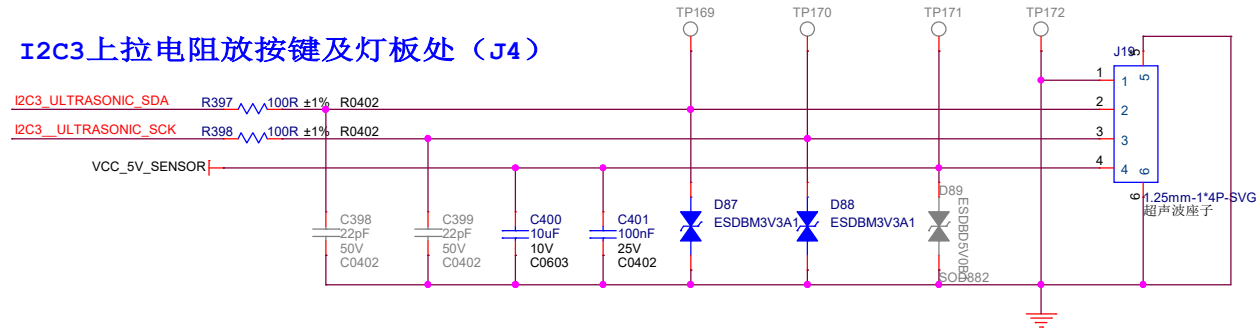
- UART2 Interface:** The daughter boards feature UART2 interfaces (UART2_LIDAR_RX, UART2_LIDAR_TX, LIDAR_PWM, LOADSWITCH_FAULT, LOADSWITCH_EN) connected to the main board.
- Resistors:** Resistors (R389, R390, R391, R392) are used for signal conditioning on the daughter boards.
- Capacitors:** Decoupling capacitors (C402) are used to filter noise from the power supply on the daughter boards.

5	4	3	2	1
---	---	---	---	---

{2^,12} I2C3_BUT&ULTRA_SCK I2C3_BUT&ULTRA_SCK
{2^,12,20} I2C3_BUT&ULTRA_SDA I2C3_BUT&ULTRA_SDA



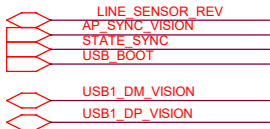
I2C3上拉电阻放按键及灯板处（J4）



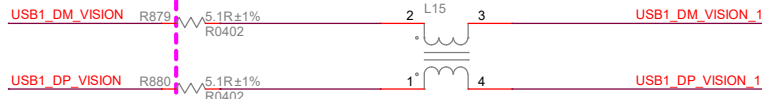
NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 04 Ultrasonic Sensor	Rev: V1
Part Number		Sheet 35 of 41
Modify Date	Wednesday, July 24, 2024	

{2^,12} LINE_SENSOR_REV
{2^,12} AP_SYNC_VISION
{2^,12} STATE_SYNC
{2^,12} USB_BOOT

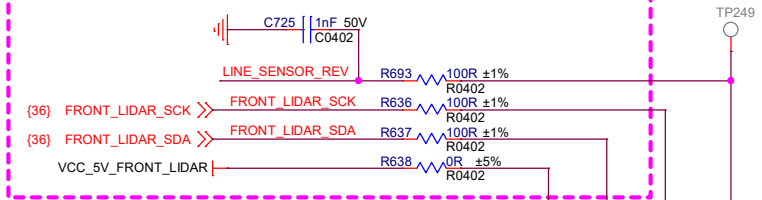
{2^,16} USB1_DM_VISION
{2^,16} USB1_DP_VISION



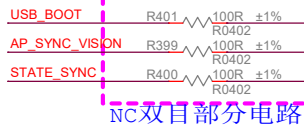
NC双目部分电路



适配前线激光



主机控制从机升级
主机跟从机时钟同步
从机跟主机状态同步

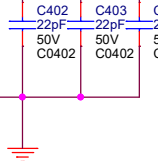


NC双目部分电路

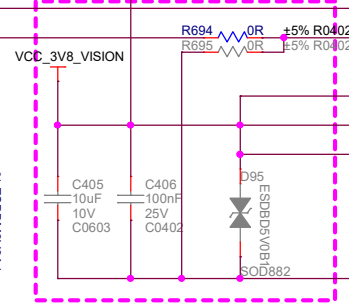
前线激光: R693/R636/R637/R638/R694
双目模块: R399/R400/R401/R879/R880/R695/L15/D93/D94
R693/R636/R637/R638/R694
R399/R400/R401/R879/R880/R695/L15/D93/D94

贴片
NC
贴片

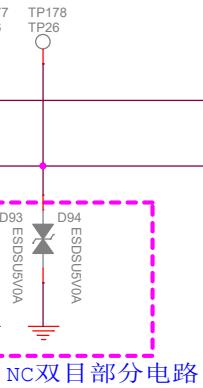
TP173



线激光: D90上件ESD5D150TA
双目: D90上件ESD3V3D250TA



适配前线激光 NC双目部分电路



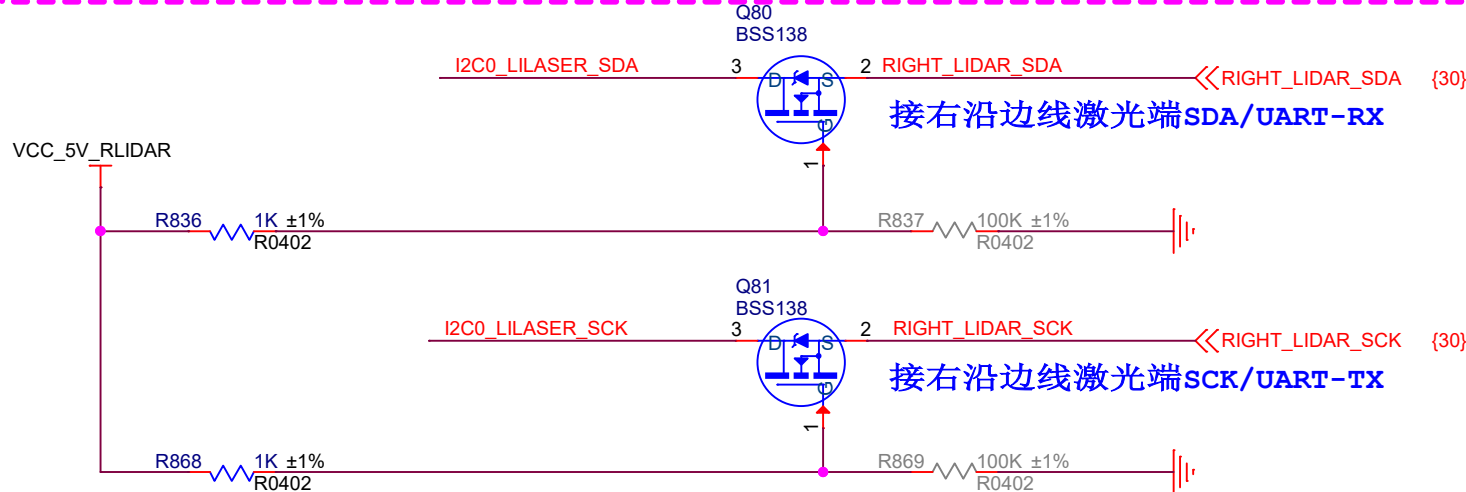
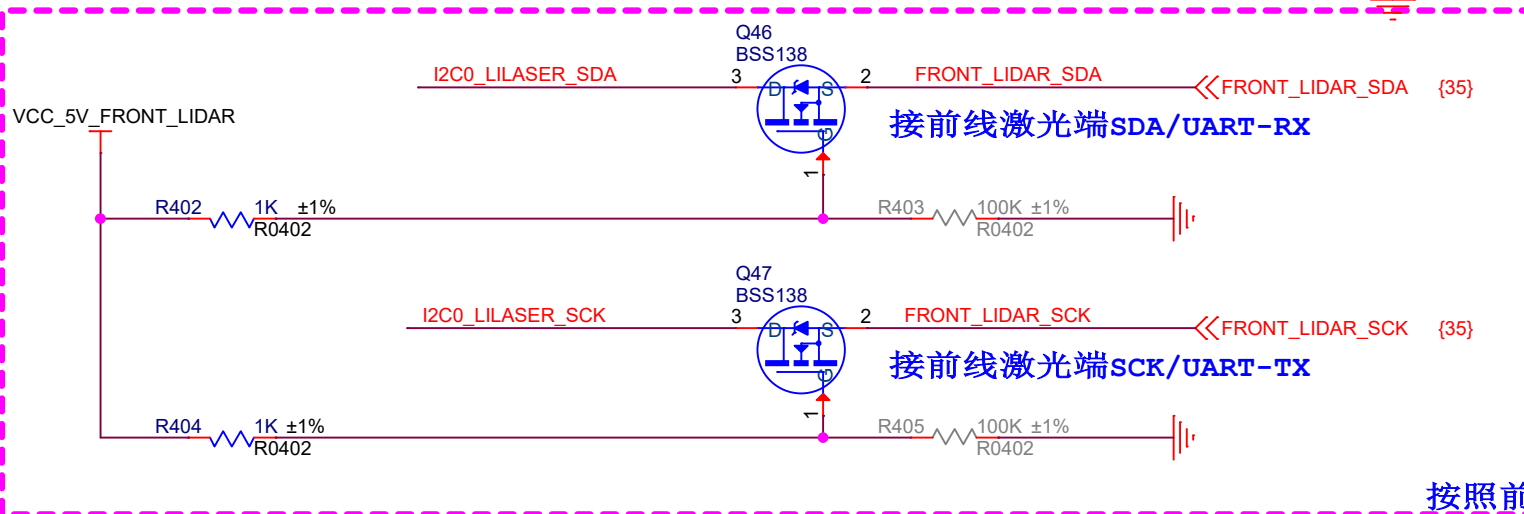
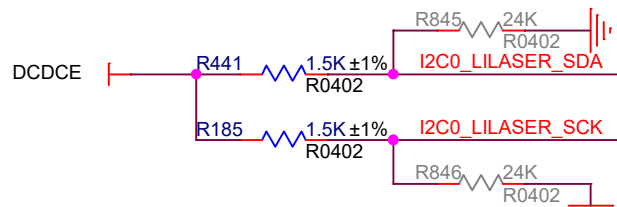
NC双目部分电路

1.0mm-1*12P-SVG
WAF12-1_0-4_5-SVG

双目座子

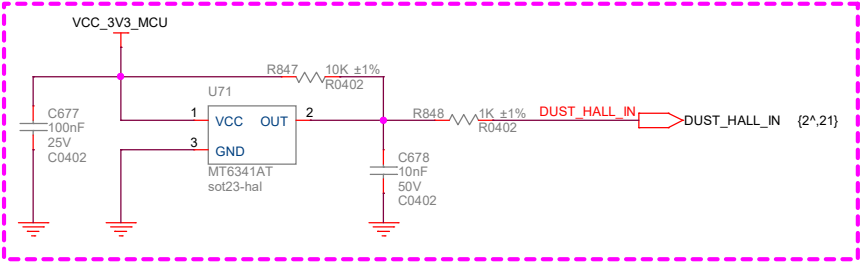
NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 05 Vision Module	Rev: V1
Part Number		Sheet 36 of 41
Modify Date	Wednesday, July 24, 2024	

{2^,12} I2C0_LILASER_SCK I2C0_LILASER_SCK
{2^,12} I2C0_LILASER_SDA I2C0_LILASER_SDA



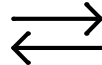
NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 06 Line Sensor	Rev: V1
Part Number		Sheet 37 of 41
Modify Date	Wednesday, July 24, 2024	

NC尘盒霍尔传感器



NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 07 HALL	Rev: V1
Part Number		Sheet 38 of 41
Modify Date	Wednesday, July 24, 2024	

MCU

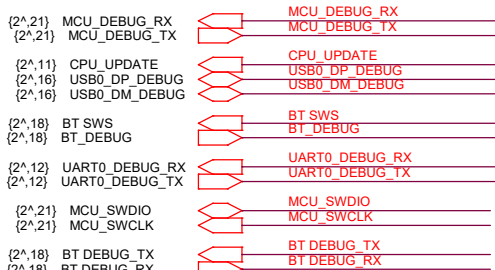


MR813



调试烧录接口

量产时NC



VCC_3V3_MCU



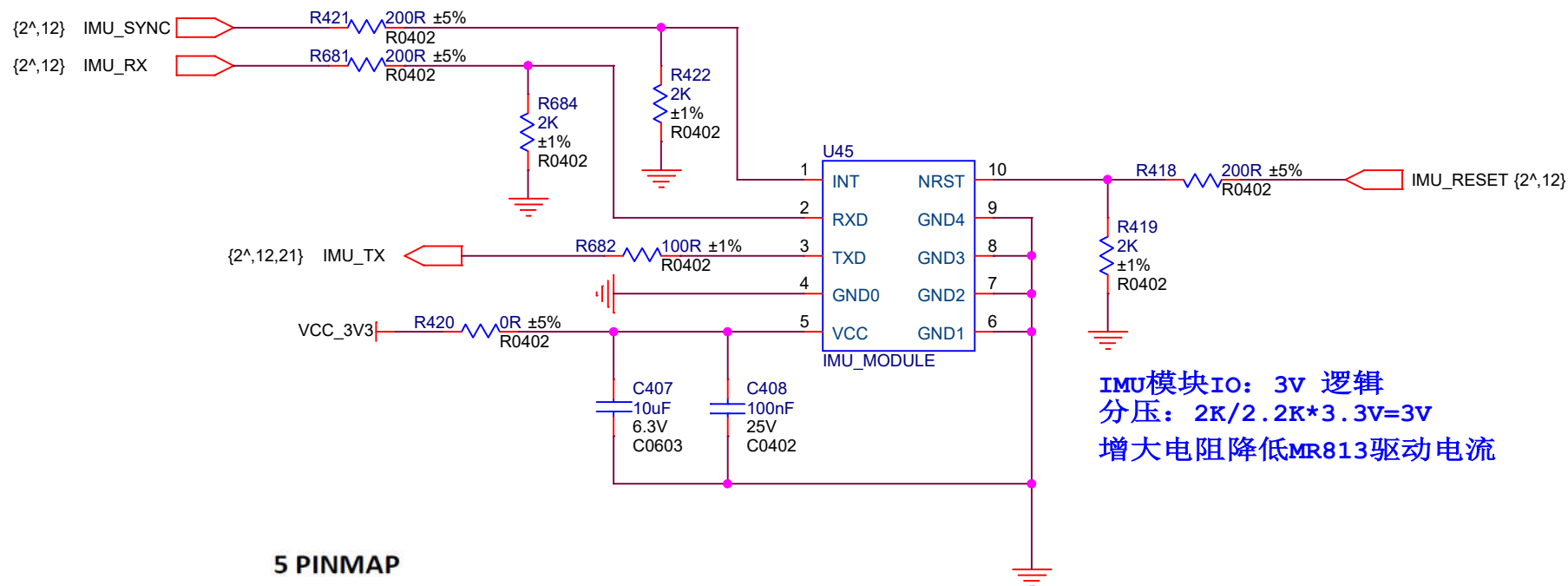
MCU_DEBUG_RX

VCC_IO



UART0_DEBUG_RX

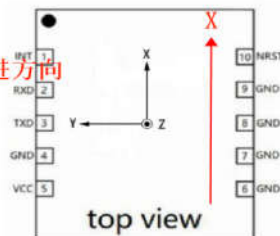
NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 00 DEBUG	Rev: V1
Part Number		Sheet 39 of 41
Modify Date	Wednesday, July 24, 2024	



IMU模块IO: 3V 逻辑
分压: $2K/2.2K \times 3.3V = 3V$
增大电阻降低MR813驱动电流

5 PINMAP

布局注意:
X方向为机器人前进方向



引脚号	引脚名称	引脚类型	说明
1	INT	数字输入	选择 UART 输出, 任何状态都有效
2	RXD	数字输入	模块串口数据输入引脚
3	TXD	数字输出	模块串口数据输出引脚

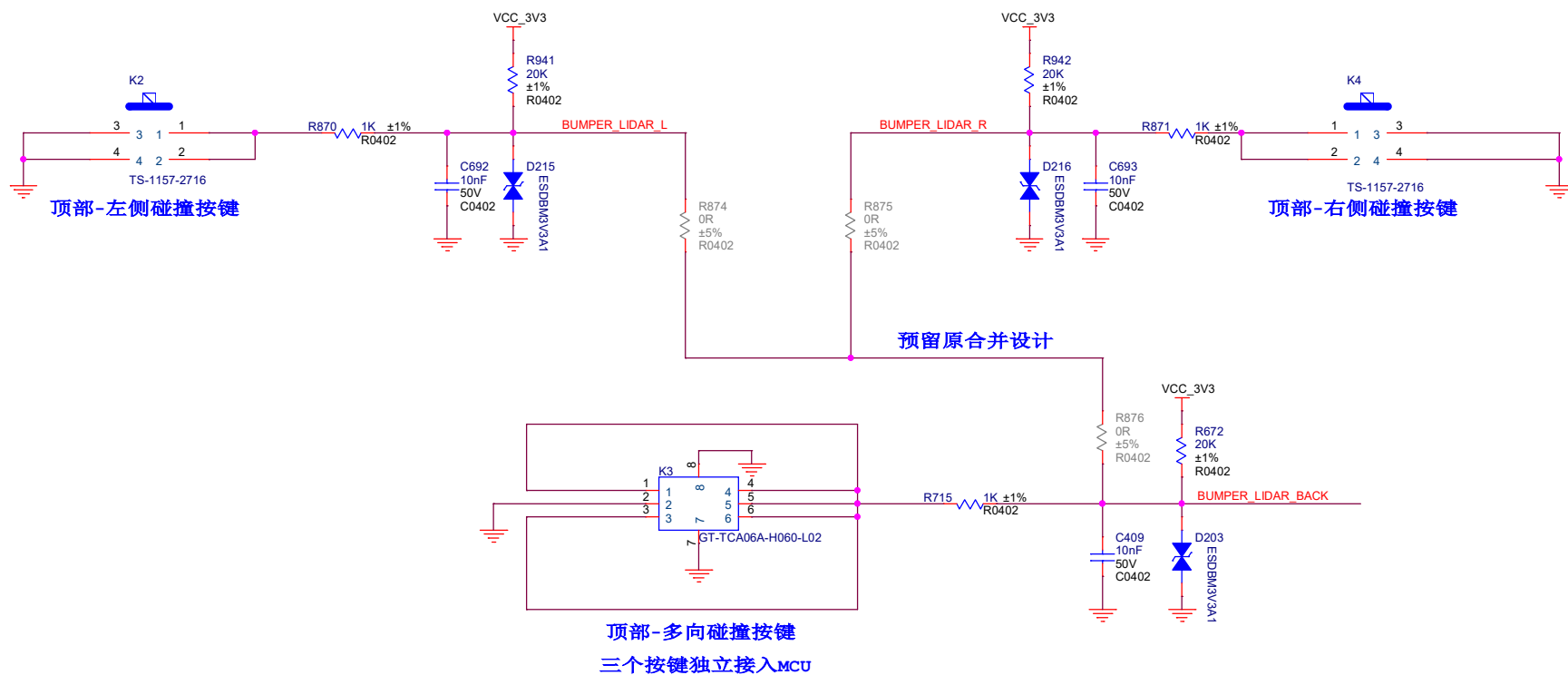
NARWAL 云鲸

Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: A	Page Name: 00 IMU	Rev: V1
Part Number		Sheet 40 of 41
Modify Date	Wednesday, July 24, 2024	

{2^,21} BUMPER_LIDAR_BACK
{2^,21} BUMPER_LIDAR_L
{2^,21} BUMPER_LIDAR_R

{2^,23} BUMPER_L
{2^,23} BUMPER_R

两颗上拉电阻NC



NARWAL 云鲸		
Design Name	IP1207_ROBOT_MB01_V2_PCBA 0724A	Author: 梁伟粤
Page Size: B	Page Name: 01 BUMPER	Rev: V1
Part Number		Sheet 41 of 41
Modify Date	Wednesday, July 24, 2024	