

# TB-96AIoT Som Schematic

PMIC: RK809-2 (5BUCK + 9LDO + Codec)  
RAM: LPDDR3  
ROM: eMMC + TF card  
Interface: MIPI CSI/MIPI DSI/UART/I2S/RMII/LCDC/PCIE/USB3

|  |                       |     |         |
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| 项目:  | TB-96AIoT             |     |         |
| 文件:  | SoM_Schematic         |     |         |
| 图纸:  | 00.Cover Page         |     |         |
| 修改日期:  | Tuesday, May 21, 2019 | 版本: | V0.1    |
| 设计者:   | chenza                | 页码: | 0 of 23 |

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## Note

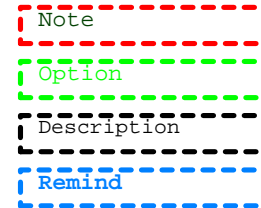
### NOTE 1:

#### Component parameter description

1. DNP stands for component not mounted temporarily
2. If Value or option is DNP, which means the area is reserved without being mounted
3. If Flash is compatible, please notice when eMMC is used, the option is that @eMMC is mounted, @Nand is not mounted when Nand is used, the option is that @Nand is mounted, @eMMC is not mounted

### NOTE 2:

Please use our recommended components to avoid too many changes. For more informations about the second source, please refer to our AVL.



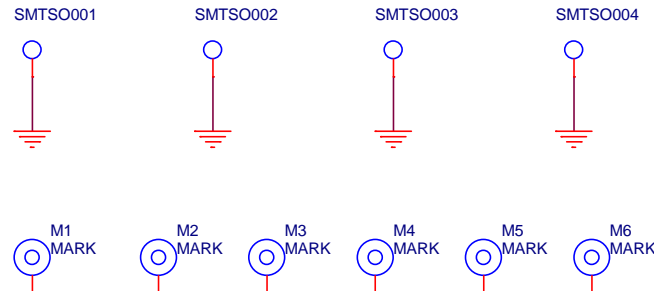
## Bill of Materials

### Header:

Item\tPart\tDescription\tPCB Footprint\tReference\tQuantity\tOption


### Combined property string:

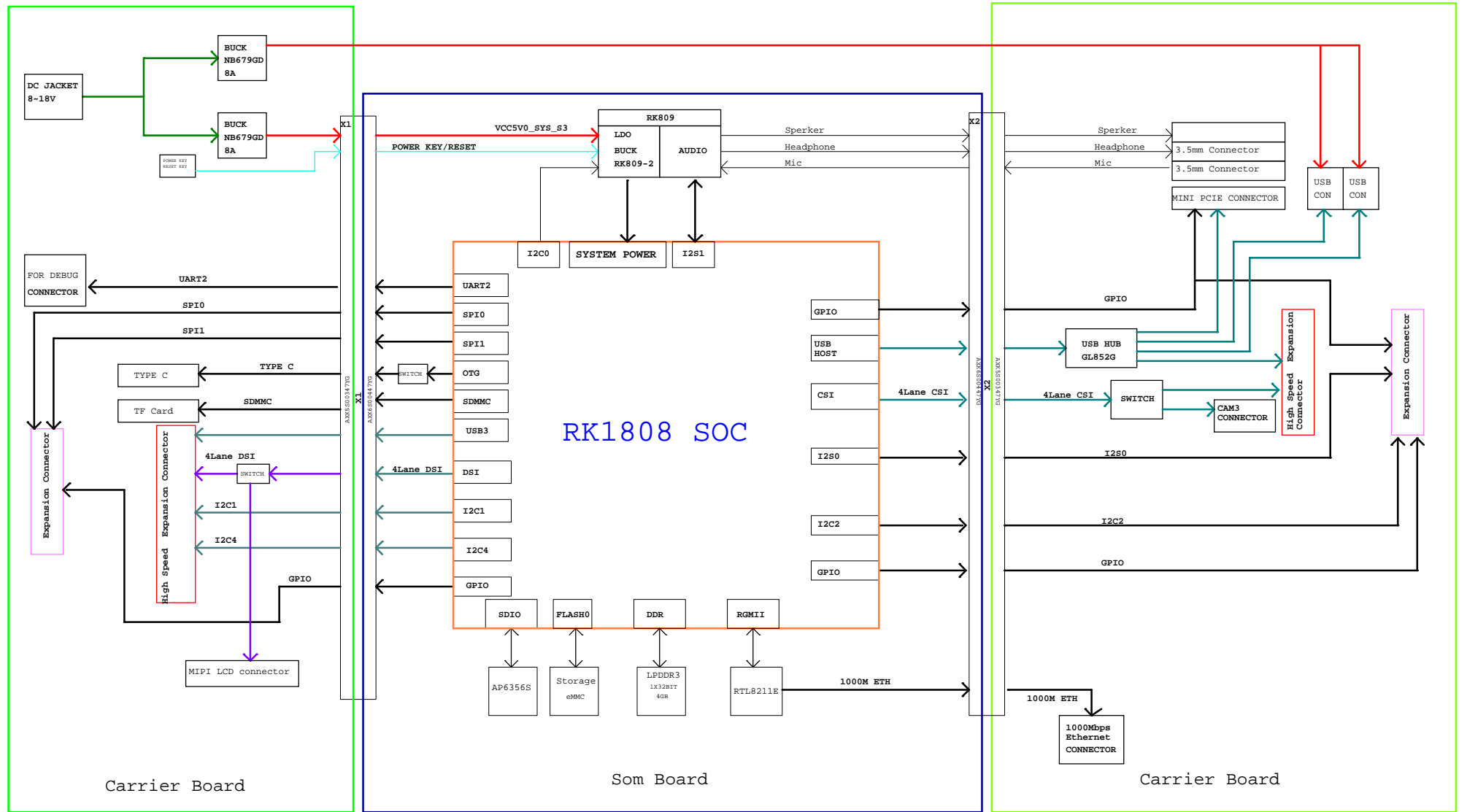
{Item}\t{Value}\t{Description}\t{PCB Footprint}\t{Reference}\t{Quantity}\t{Option}



|  |                       |     |         |
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| 文件:  | SoM_Schematic         |     |         |
| 图纸:  | 01.Index              |     |         |
| 修改日期:  | Tuesday, May 21, 2019 | 版本: | V0.1    |
| 设计者:   | chenza                | 页码: | 1 of 23 |


| Version | Date      | Author | Change List              | Approved |
|---------|-----------|--------|--------------------------|----------|
| V0.1    | 2019.2.14 |        | First edition for RK1808 | chenza   |
|         |           |        |                          |          |
|         |           |        |                          |          |

|  |                       |     |         |                   |  |
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| 项目:  | TB-96AIoT             |     |         |                   |  |
| 文件:  | SoM_Schematic         |     |         |                   |  |
| 图纸:  | 02.Revision History   |     |         |                   |  |
| 修改日期:  | Tuesday, May 21, 2019 | 版本: | V0.1    |                   |  |
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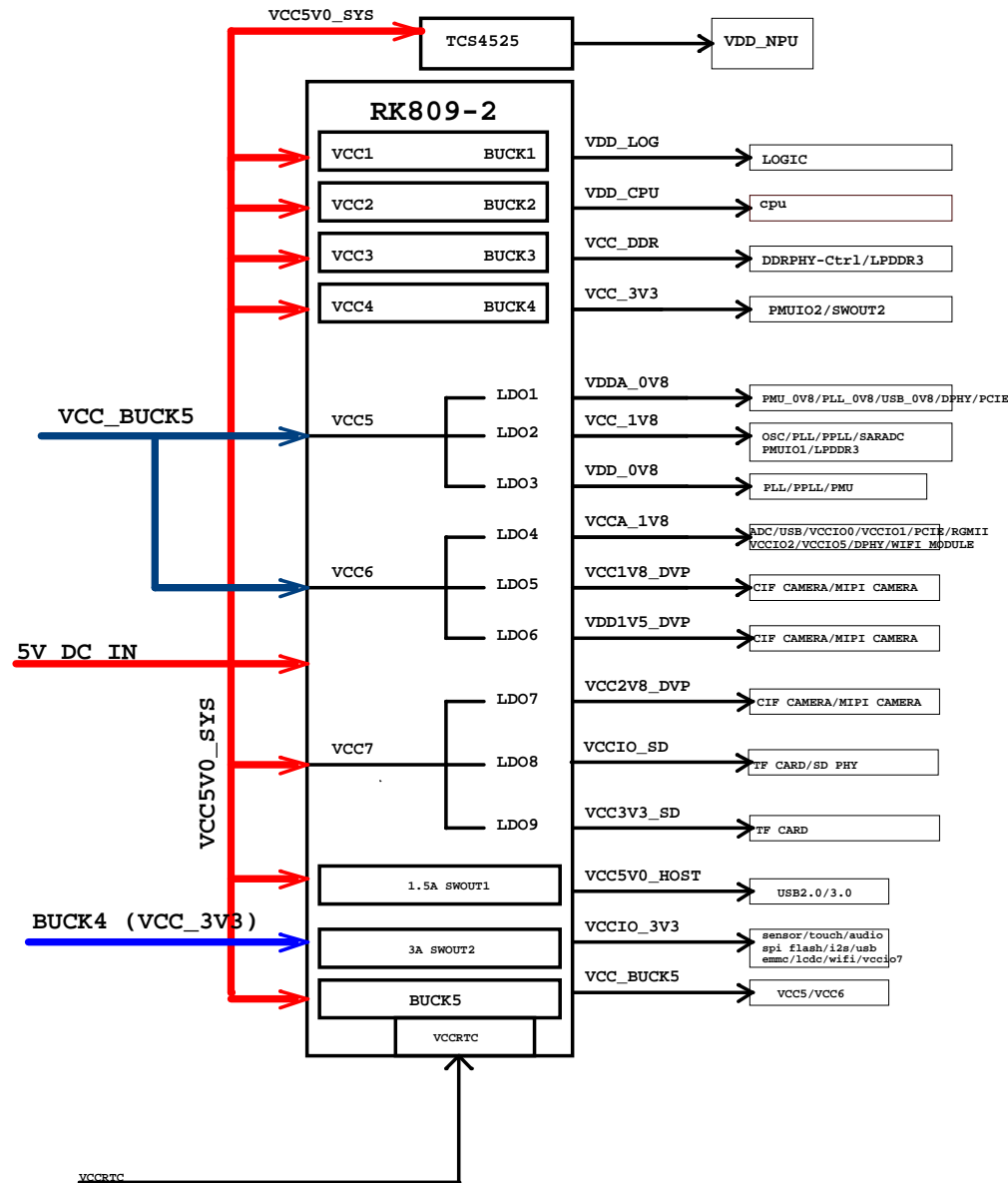


# I2C MAP

| Port | Pin name                                   | Domain    | Bus name                       | Pull-up voltage | Slave Device     | Slave Addr (MS 7Bits) | Note     | Slave Bus Capability           |
|------|--|-----------|--------------------------------|-----------------|------------------|-----------------------|----------|--------------------------------|
| I2C0 | I2C0_SCL/GPIO0_B0_u<br>I2C0_SDA/GPIO0_B1_u | PMUIO2    | I2C0_SCL_PMIC<br>I2C0_SDA_PMIC | VCC_1V8         | Rockchip RK809-2 | 0x20                  | PMIC     | 100kHz,400kHz                  |
|      |  |           |                                |                 | TCS4525          |                       | BUCK     | 100kHz,400kHz                  |
| I2C1 | I2C1_SCL/GPIO0_C0_u<br>I2C1_SDA/GPIO0_C1_u | PMUIO2    | I2C1_SCL_TP<br>I2C1_SDA_TP     | VCC_1V8         |                  |                       | Touch IC | 100kHz,400kHz<br>100kHz,400kHz |
|      |  |           |                                |                 |                  |                       |          |                                |
| I2C2 | I2C1_SCL/GPIO3_B3_U<br>I2C1_SDA/GPIO3_B4_U | VCCA_1V8  |                                | VCCA_1V8        | CODEC            |                       |          | 100kHz,400kHz                  |
|      |  |           |                                |                 | MIPI CAMERA      |                       |          |                                |
| I2C3 | GPIO2_D0/I2C3_SCL_U<br>GPIO2_D1/I2C3_SDA_U | VCCIO_3V3 |                                |                 |                  |                       |          |                                |
| I2C4 | GPIO3_C2/I2C4_SCL_U<br>GPIO3_C3/I2C4_SDA_U | VCCA_1V8  |                                | VCCA_1V8        |                  |                       |          |                                |

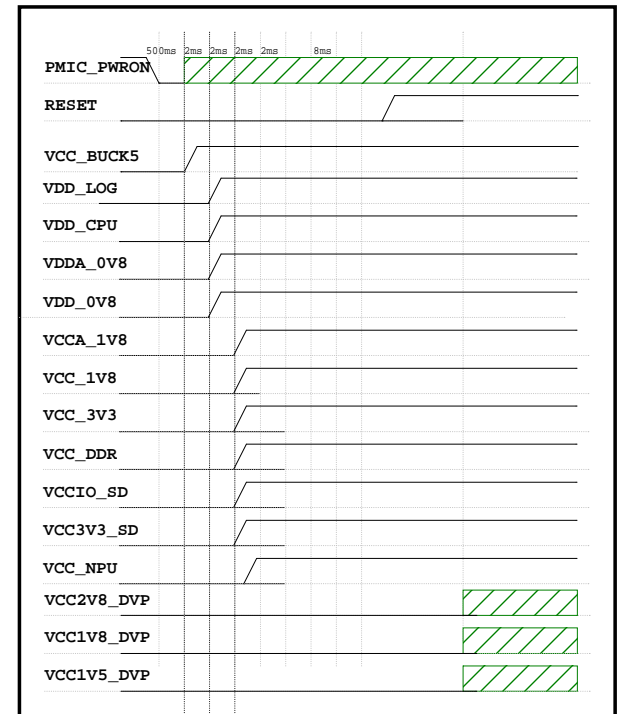
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| 文件:   | SoM_Schematic         |     |         |            |  |  |  |
| 图纸:   | 04.I2C MAP            |     |         |            |  |  |  |
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# POWER DIAGRAM

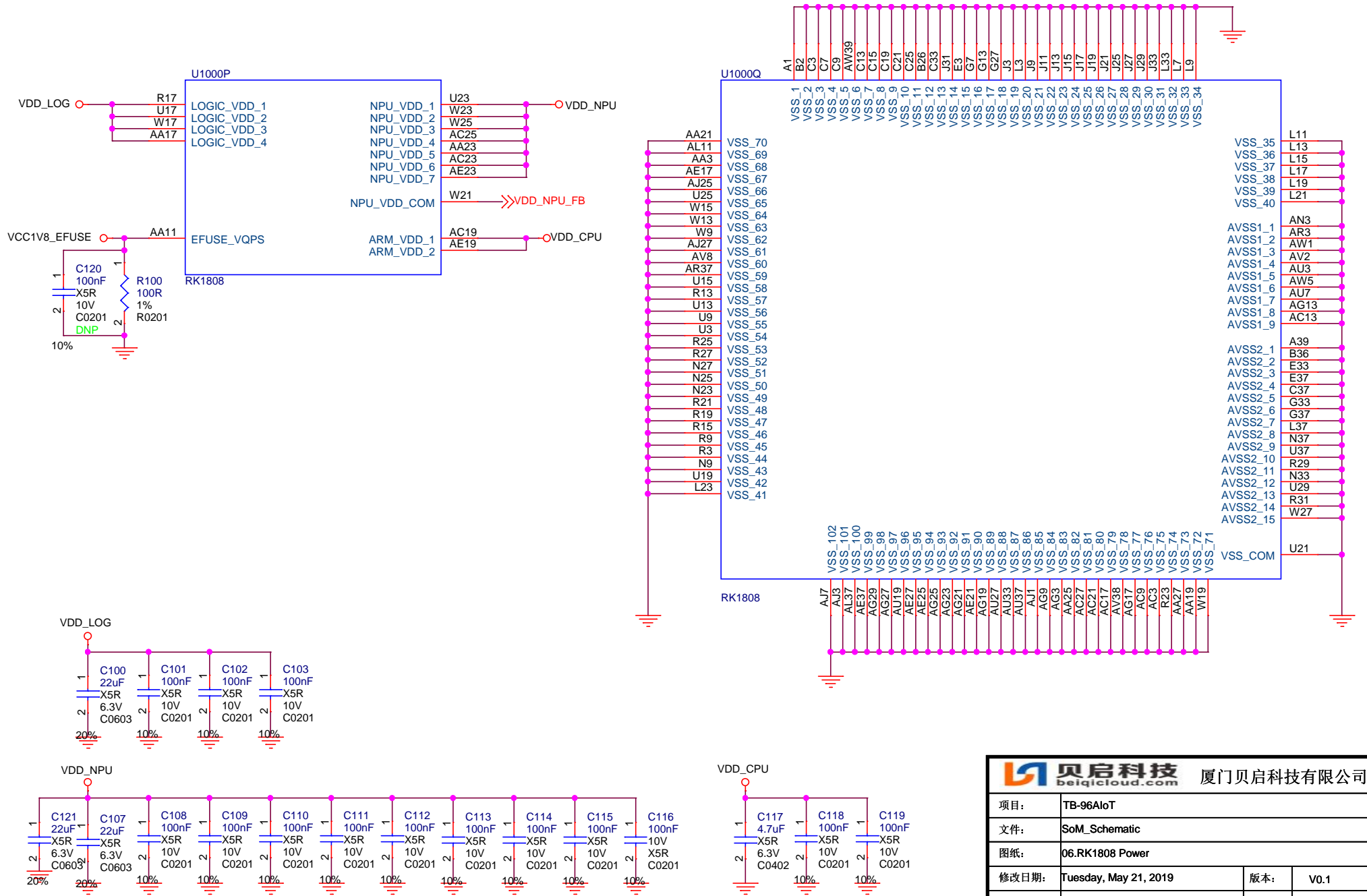


RK809-2 Power-on Sequence

| PowerName   | PMIC Channel    | Time Slot (step 2ms) | Default voltage | Supply Limit | Default ON/OFF | Sleep ON/OFF | Peak Current |
|-------------|-----------------|----------------------|-----------------|--------------|----------------|--------------|--------------|
| VDD_NPU     | EXTERNAL(SV837) | Slot:13A             | 1V              | 6A           | ON             | OFF          | 4A           |
| VDD_LOG     | BUCK1           | Slot:2               | 0.85V           | 2.5A         | ON             | OFF          | 1.25A        |
| VDD_CPU     | BUCK2           | Slot:2               | 0.85V           | 2.5A         | ON             | OFF          | 750mA        |
| VCC_DDR     | BUCK3           | Slot:3               | FB=0.6V         | 1.5A         | ON             | ON           |              |
| VCC_3V3     | BUCK4           | Slot:4               | 3.3V            | 1.5A         | ON             | ON           |              |
| VCC_BUCK5   | BUCK5           | Slot:1               | 2.5V            | 2.5A         | ON             | ON           |              |
| VDDA_0V8    | LDO1            | Slot:2               | 0.8V            | 400mA        | ON             | OFF          |              |
| VCC_1V8     | LDO2            | Slot:3               | 1.8V            | 400mA        | ON             | ON           |              |
| VDD_0V8     | LDO3            | Slot:2               | 0.8V            | 100mA        | ON             | ON           |              |
| VCCA_1V8    | LDO4            | Slot:3               | 1.8V            | 400mA        | ON             | OFF          |              |
| VCC1V8_DVP  | LDO5            |                      | 1.8V            | 400mA        | OFF            | OFF          |              |
| VDD1V5_DVP  | LDO6            |                      | 1.5V            | 400mA        | OFF            | OFF          |              |
| VCC2V8_DVP  | LDO7            |                      | 2.8V            | 400mA        | OFF            | OFF          |              |
| VCCIO_SD    | LDO8            | Slot:4               | 3.3V            | 400mA        | ON             | OFF          |              |
| VCC3V3_SD   | LDO9            | Slot:4               | 3.3V            | 400mA        | ON             | OFF          |              |
| VCCIO_3V3   | SWOUT2          | Slot:4               | 3.3V            | 3A           | ON             | OFF          |              |
| VCC5V0_HOST | SWOUT1          |                      | 5V              | 1.5A         | OFF            | OFF          |              |
| RESET       | RESETB          | Slot:10              | OD              |              |                |              |              |

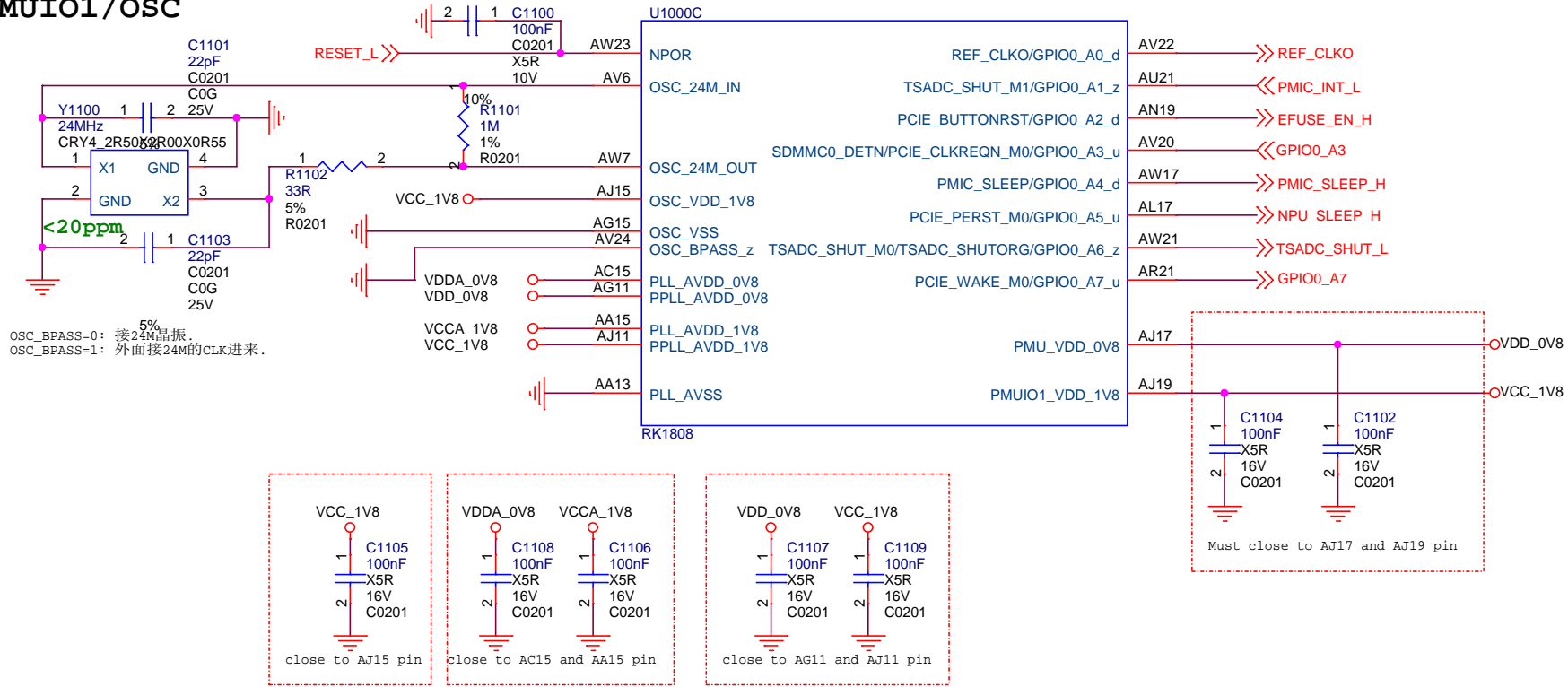


# RK1808 Power

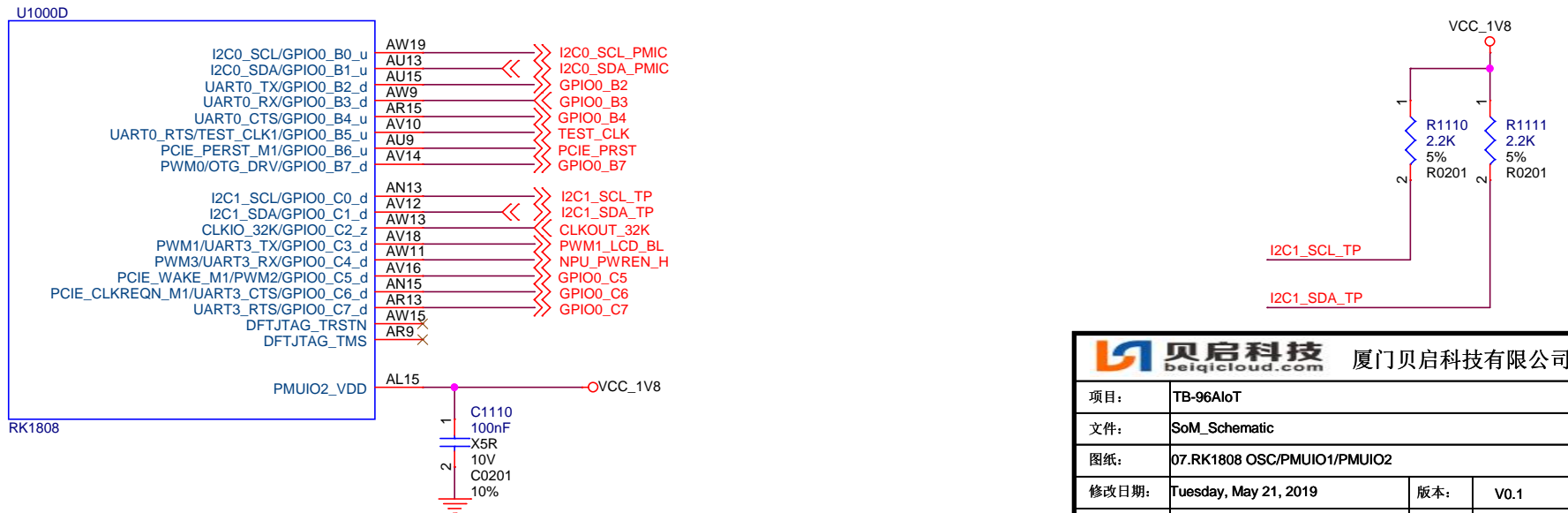


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| 文件:   | SoM_Schematic         |     |         |
| 图纸:   | 06.RK1808 Power       |     |         |
| 修改日期: | Tuesday, May 21, 2019 | 版本: | V0.1    |
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# PMUIO1/OSC



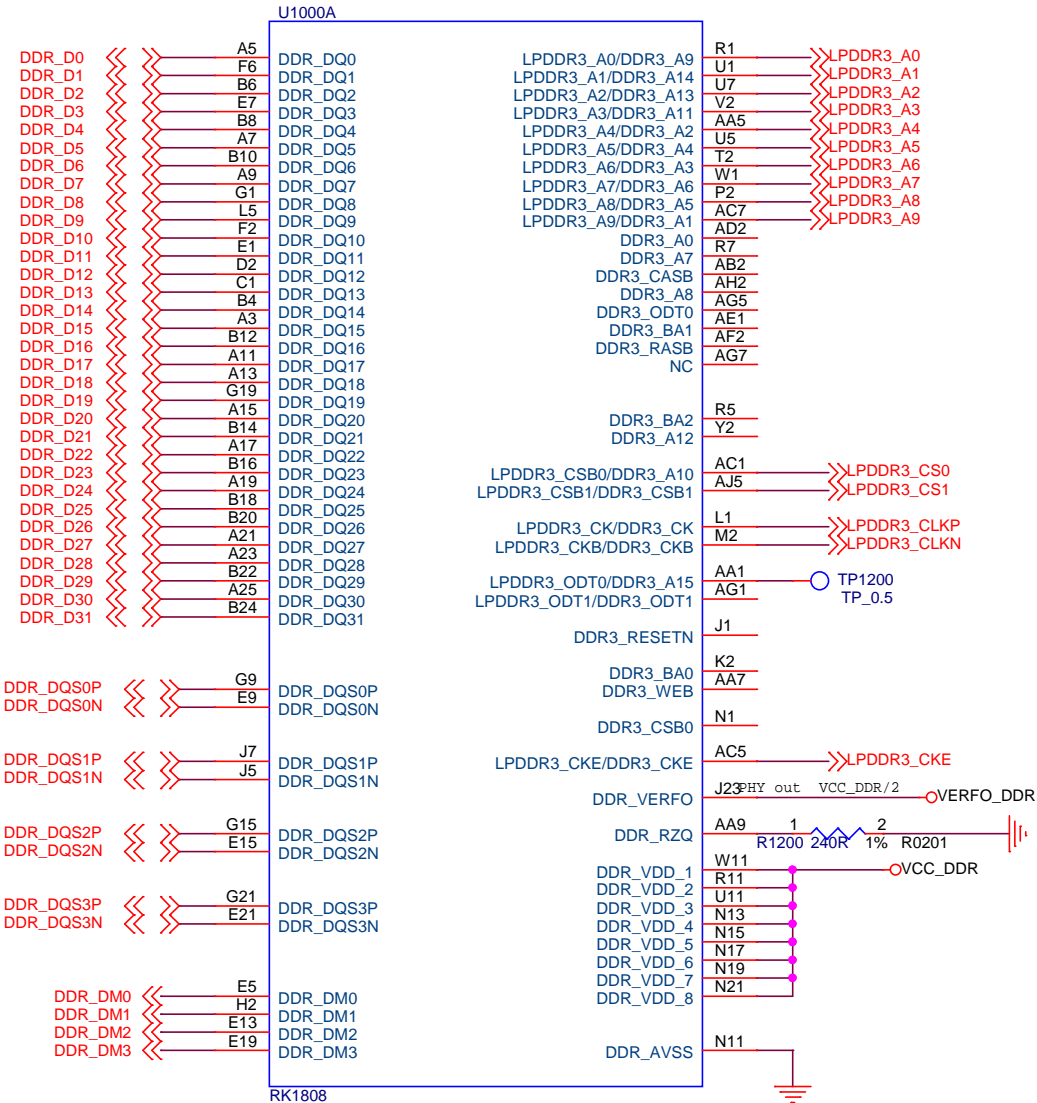
# PMUIO2



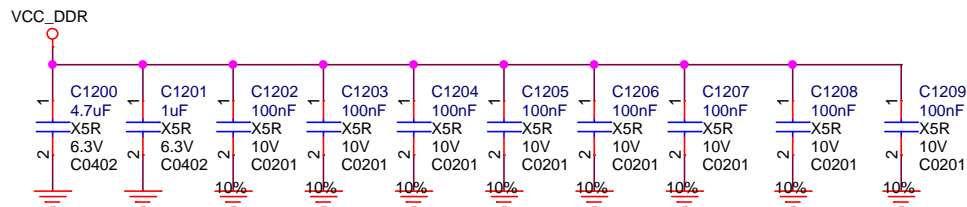
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| 项目:  | TB-96AIoT                   |     |         |
| 文件:  | SoM_Schematic               |     |         |
| 图纸:  | 07.RK1808 OSC/PMUIO1/PMUIO2 |     |         |
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# DDR Controller



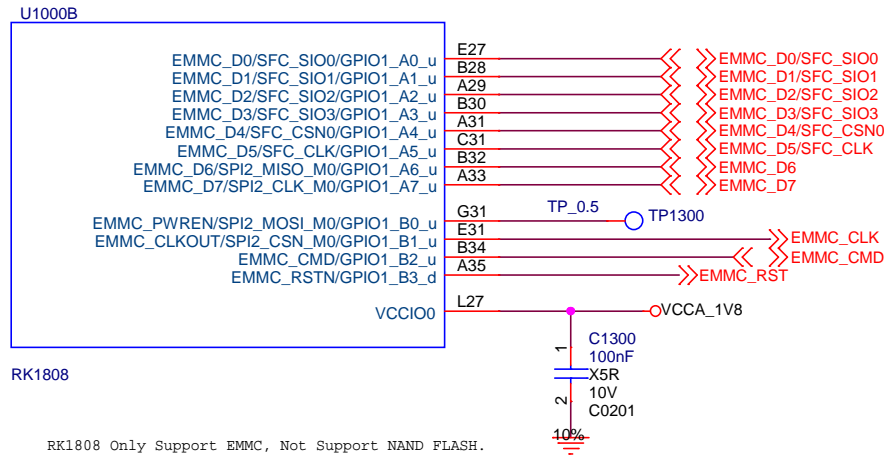
| LPDDR3/LPDDR2 | DDR3   |
|---------------|--------|
| A0            | A9     |
| A1            | A14    |
| A2            | A13    |
| A3            | A11    |
| A4            | A2     |
| A5            | A4     |
| A6            | A3     |
| A7            | A6     |
| A8            | A5     |
| A9            | A1     |
|               | A0     |
|               | A7     |
|               | CASB   |
|               | A8     |
|               | ODT0   |
|               | BA1    |
|               | RASB   |
|               |        |
|               | CSB0   |
|               | BA2    |
|               | A12    |
|               | BA0    |
|               | WEB    |
| CK            | CK     |
| CKB           | CKB    |
| CKE           | CKE    |
| CSB0          | A10    |
| CSB1          | CSB1   |
| ODT0          | A15    |
| ODT1          | ODT1   |
|               | RESETN |



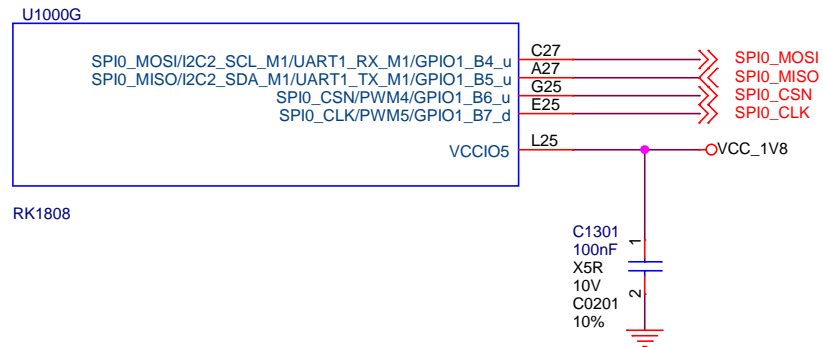
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| 项目:   | TB-96AIoT                |     |         |
| 文件:   | SoM_Schematic            |     |         |
| 图纸:   | 08.RK1808 DDR Controller |     |         |
| 修改日期: | Tuesday, May 21, 2019    | 版本: | V0.1    |
| 设计者:  | chenza                   | 页码: | 8 of 23 |

# EMMC/SFC Controller



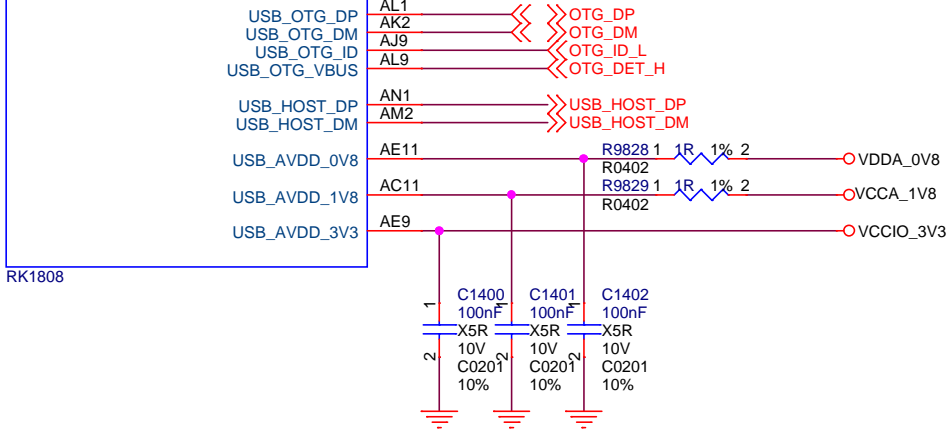
# SPI0 Controller



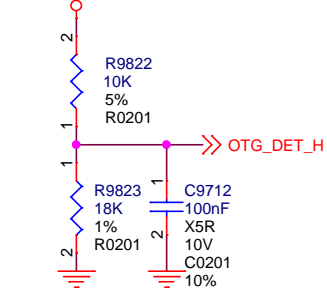
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| 文件:  | SoM_Schematic                  |     |         |
| 图纸:  | 09.RK1808 EMMC /SPI Controller |     |         |
| 修改日期:  | Tuesday, May 21, 2019          | 版本: | V0.1    |
| 设计者:   | chenza                         | 页码: | 9 of 23 |

# USB Controller

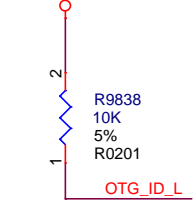
U1000E



VCC5V0\_OTG

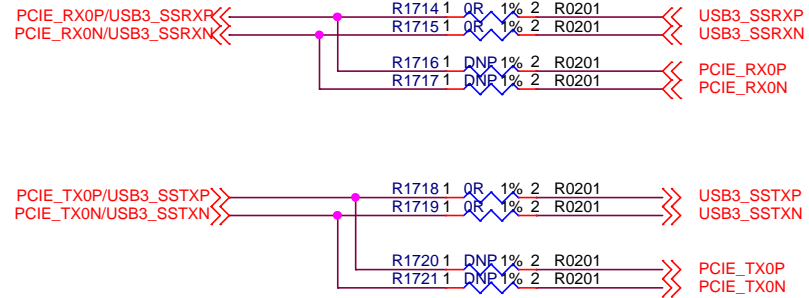
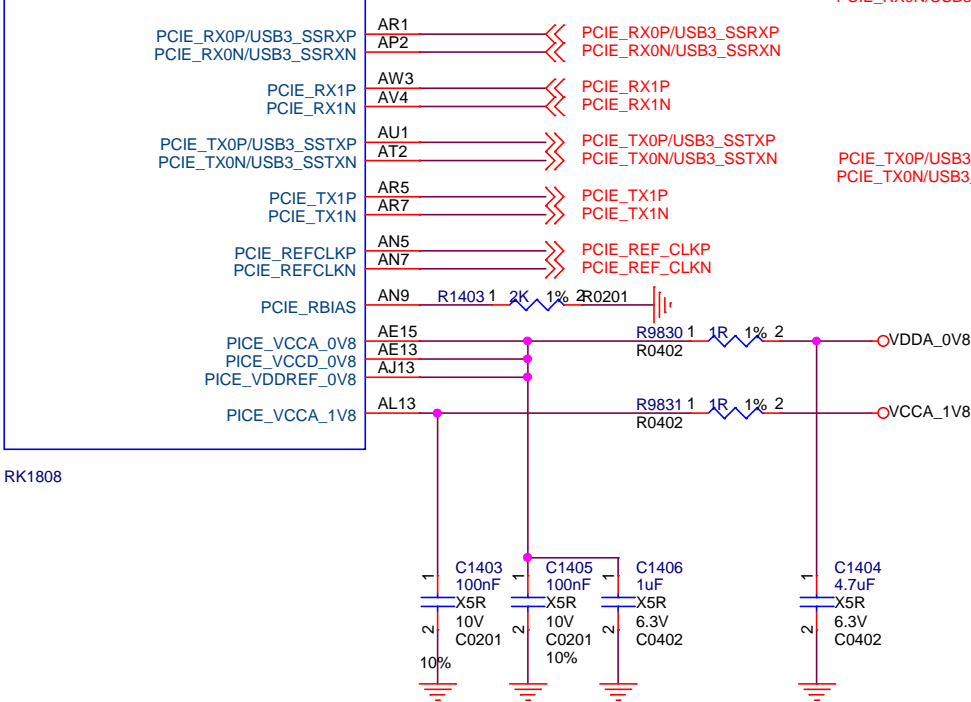



VCCIO\_3V3



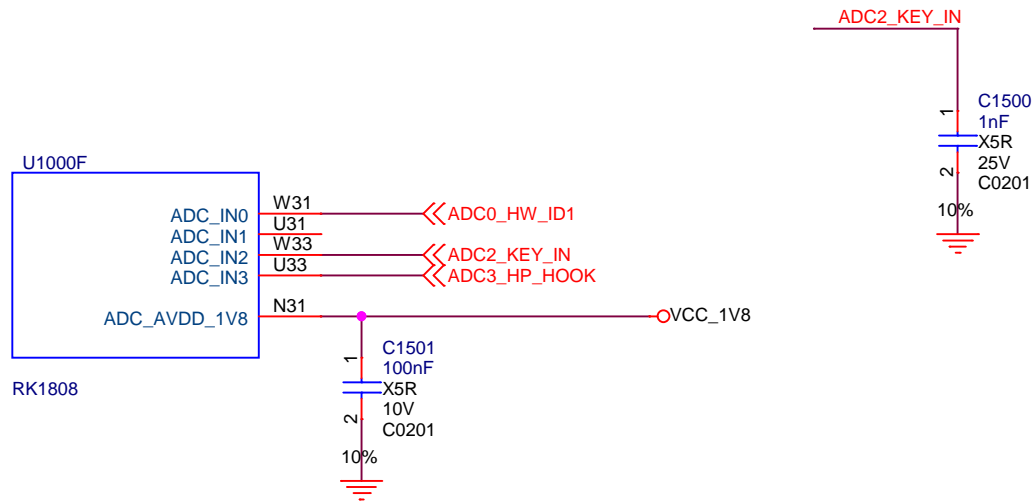
# PCIE Controller

U1000M

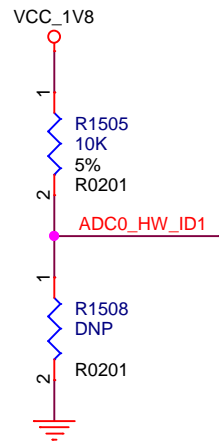


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| 项目:  | TB-96AIoT                     |     |          |
| 文件:  | SoM_Schematic                 |     |          |
| 图纸:  | 10.RK1808 USB/PCIE Controller |     |          |
| 修改日期:  | Tuesday, May 21, 2019         | 版本: | V0.1     |
| 设计者:   | chenza                        | 页码: | 10 of 23 |

# SARADC/KEY

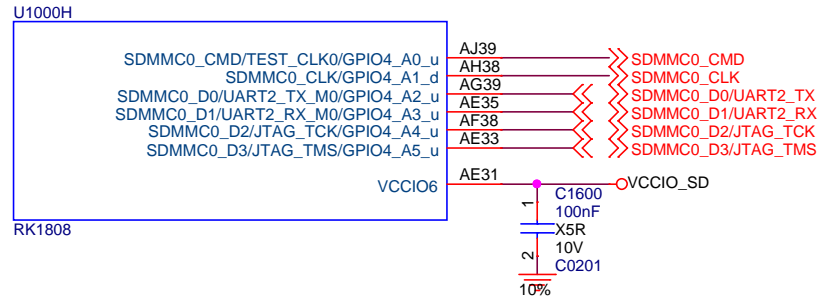


|               |        |
|---------------|--------|
| Key Name      | SARADC |
| VOL+/RECOVERY | 10     |
| VOL-          | 170    |
|               |        |

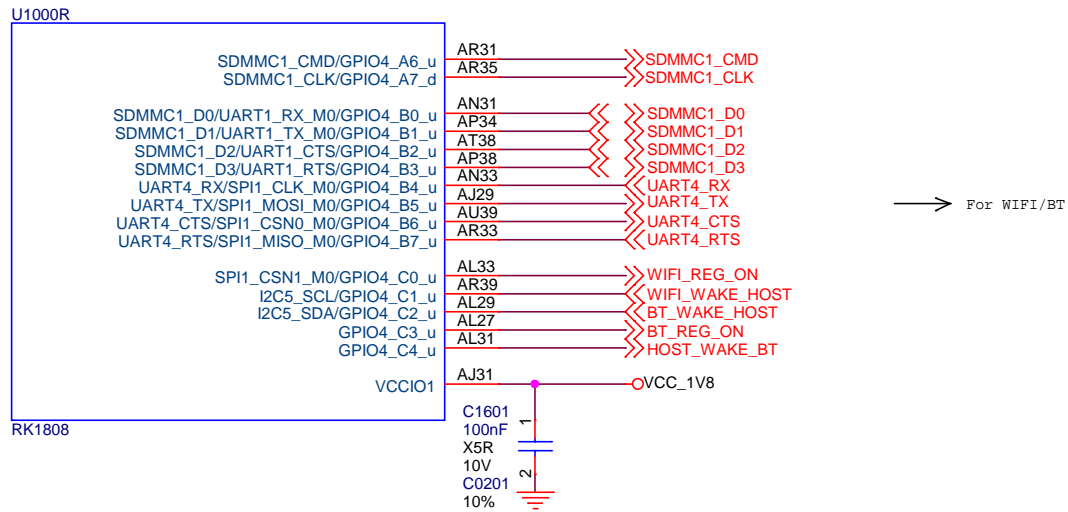


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| 文件:   | SoM_Schematic         |     |          |
| 图纸:   | 11.RK1808 SARADC/KEY  |     |          |
| 修改日期: | Tuesday, May 21, 2019 | 版本: | V0.1     |
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# SDMMC0 Controller

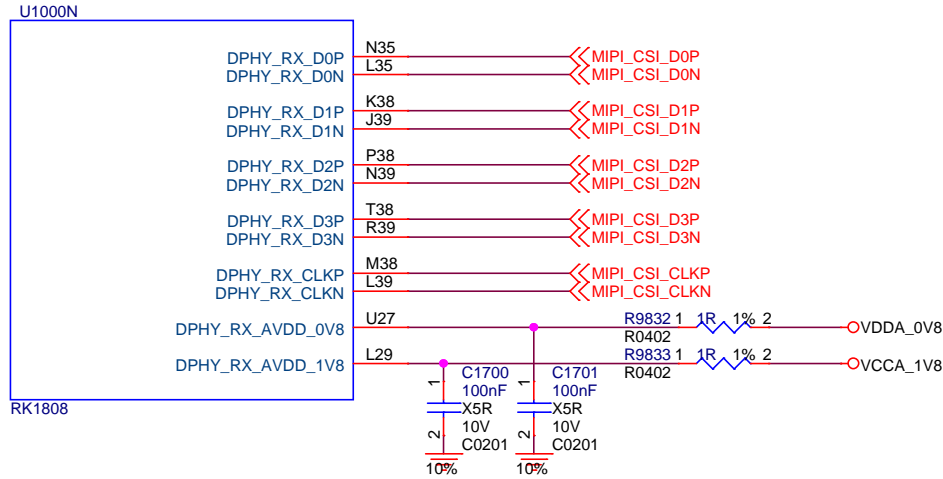


# SDMMC1 Controller

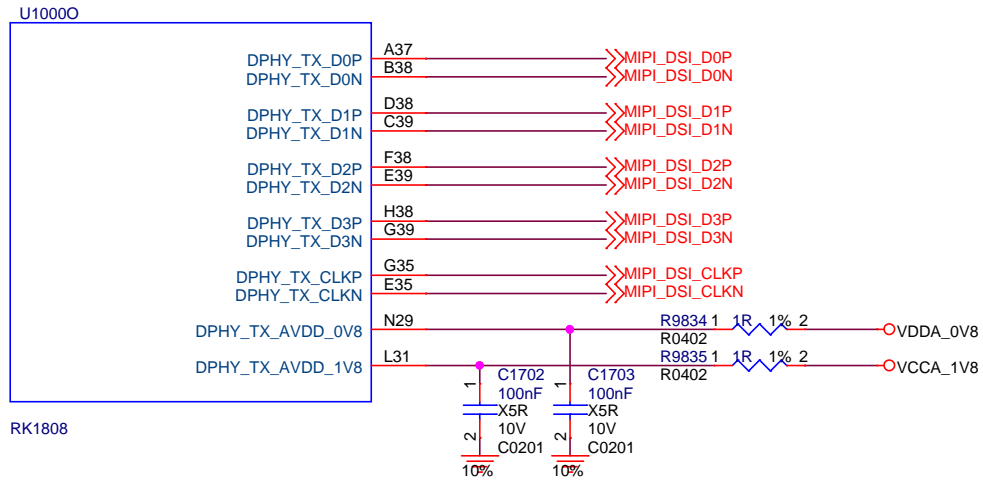



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| 项目:   | TB-96AIoT               |     |          |
| 文件:   | SoM_Schematic           |     |          |
| 图纸:   | 12.RK1808 SDMMC0/SDMMC1 |     |          |
| 修改日期:   | Tuesday, May 21, 2019   | 版本: | V0.1     |
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# MIPI CSI Controller

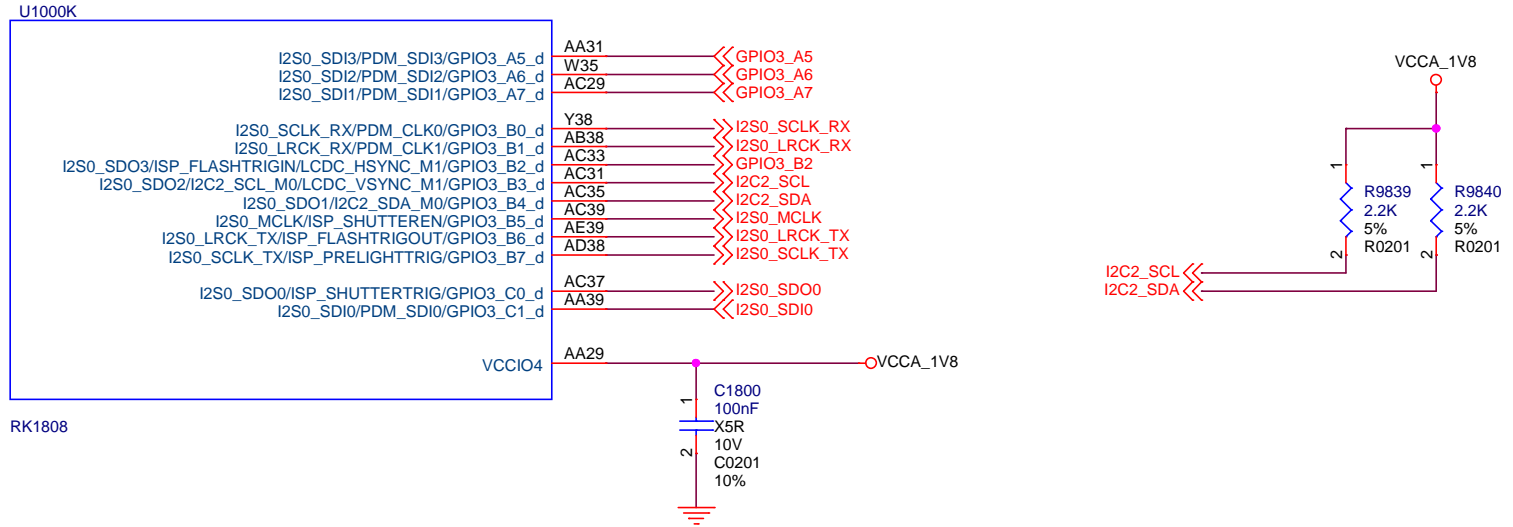


# MIPI DSI Controller

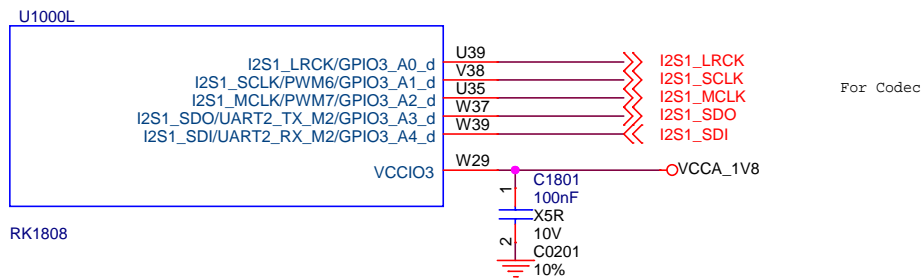



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| 项目:   | TB-96AIoT              |                   |          |
| 文件:   | SoM_Schematic          |                   |          |
| 图纸:   | 13.RK1808 MIPI DSI/CSI |                   |          |
| 修改日期:   | Tuesday, May 21, 2019  | 版本:               | V0.1     |
| 设计者:  | chenza                 | 页码:               | 13 of 23 |

# I2S0 Controller

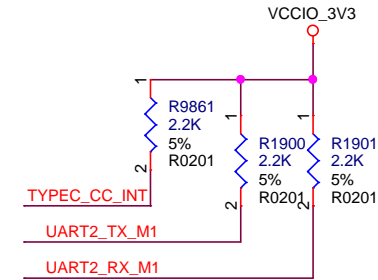
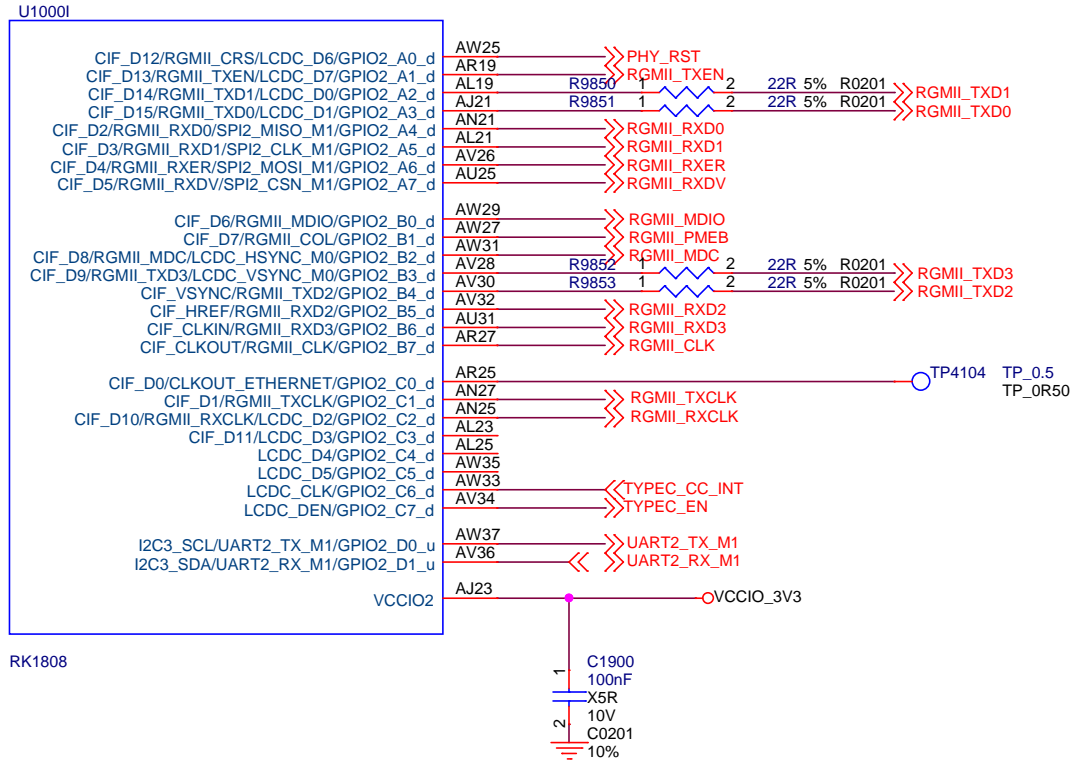


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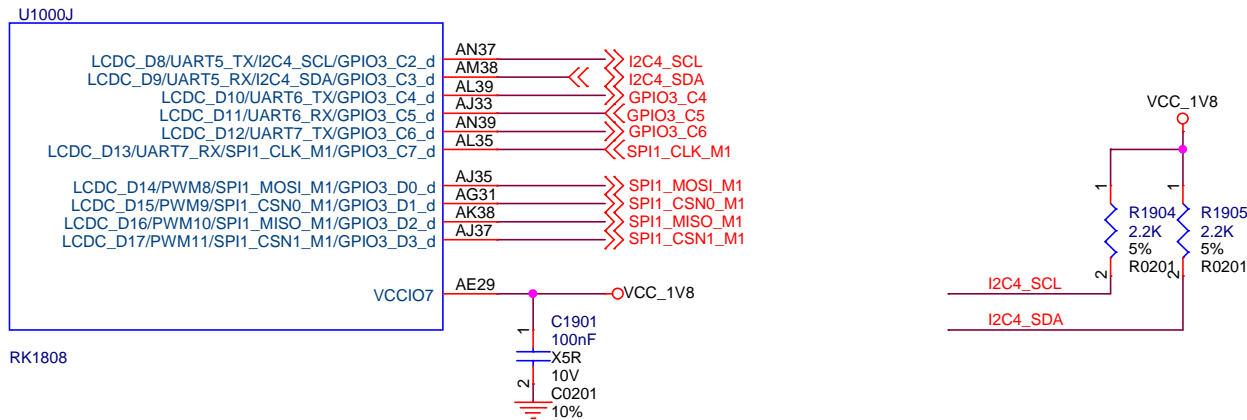



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| 文件:  | SoM_Schematic         |     |          |
| 图纸:  | 14.RK1808 I2S0/I2S1   |     |          |
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# CIF/RGMII/LCDC Controller



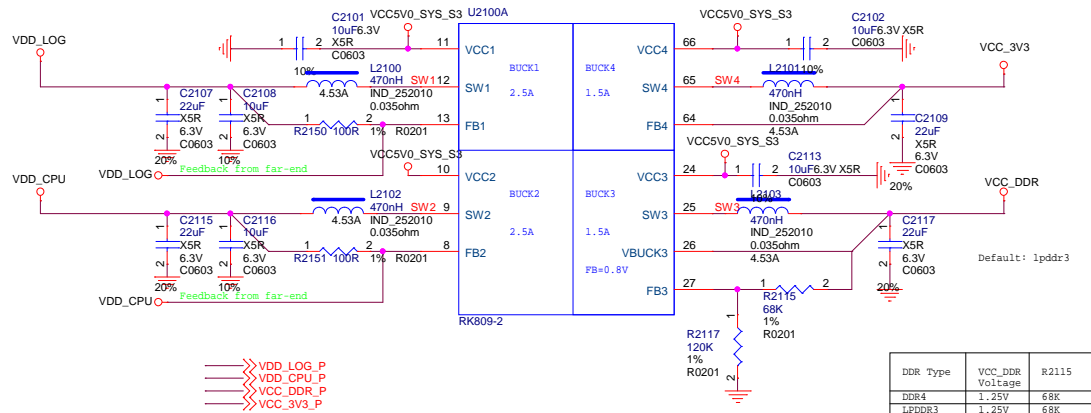
# LCDC Controller



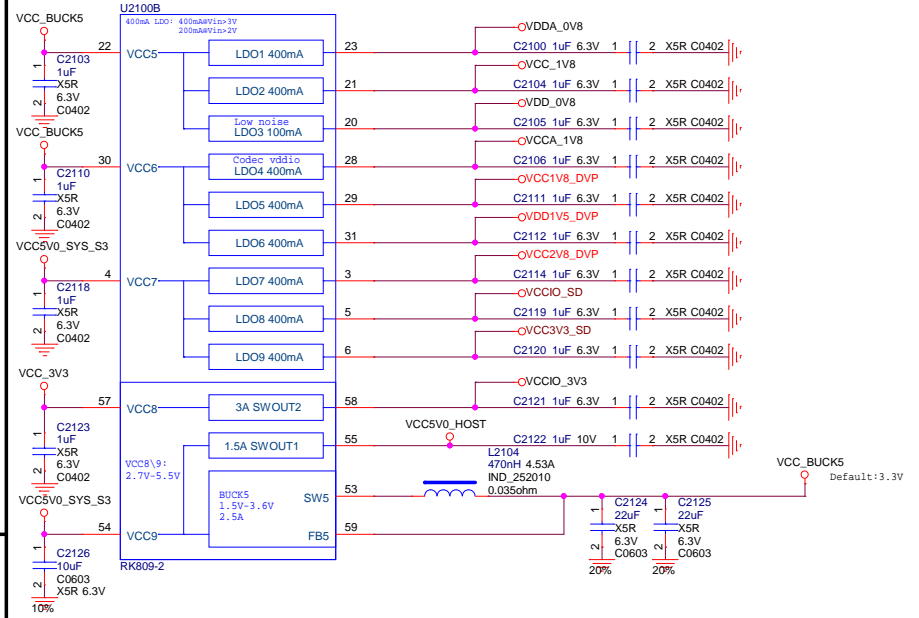
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| 文件:  | SoM_Schematic            |     |          |
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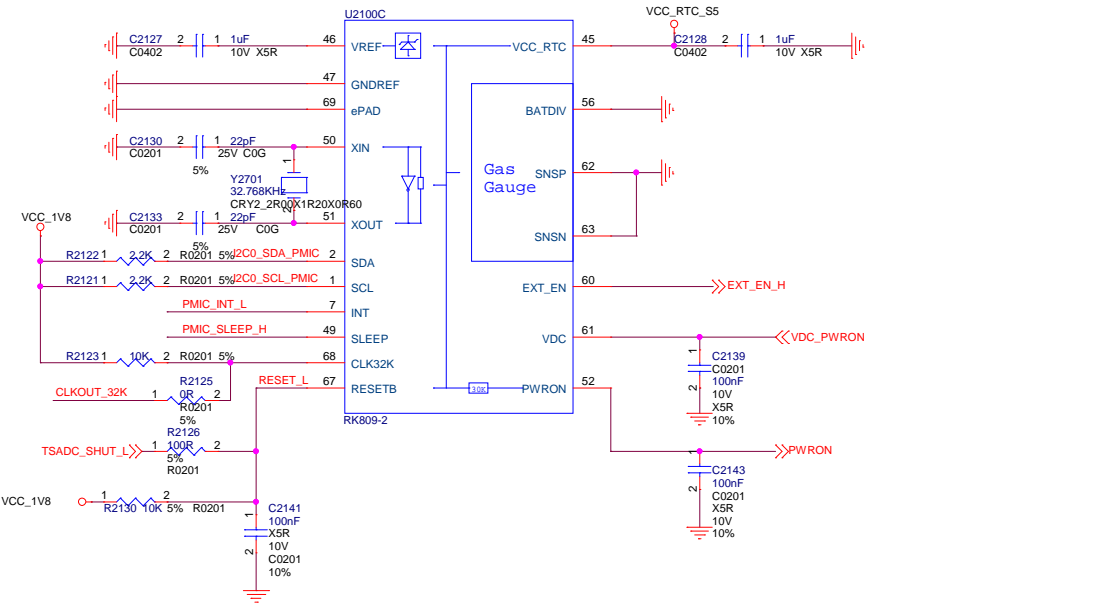
### PMIC RK809-2 DCDC



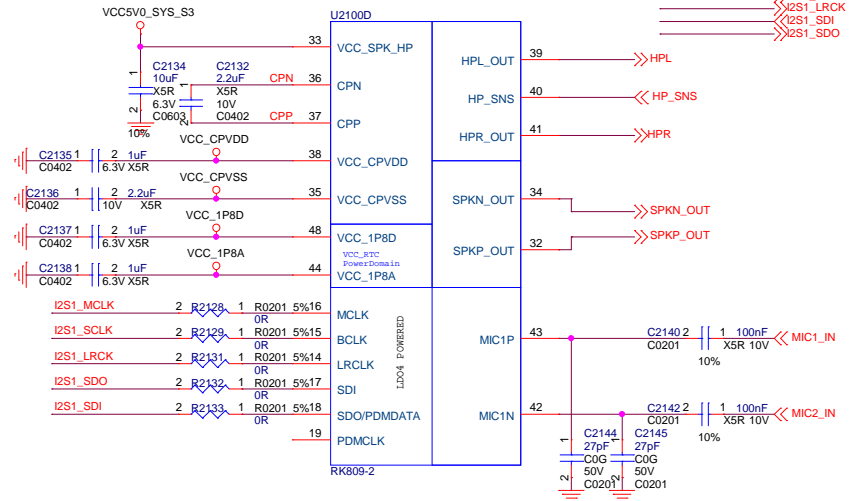
### PMIC RK809-2 LDO



### PMIC RK809-2 Management

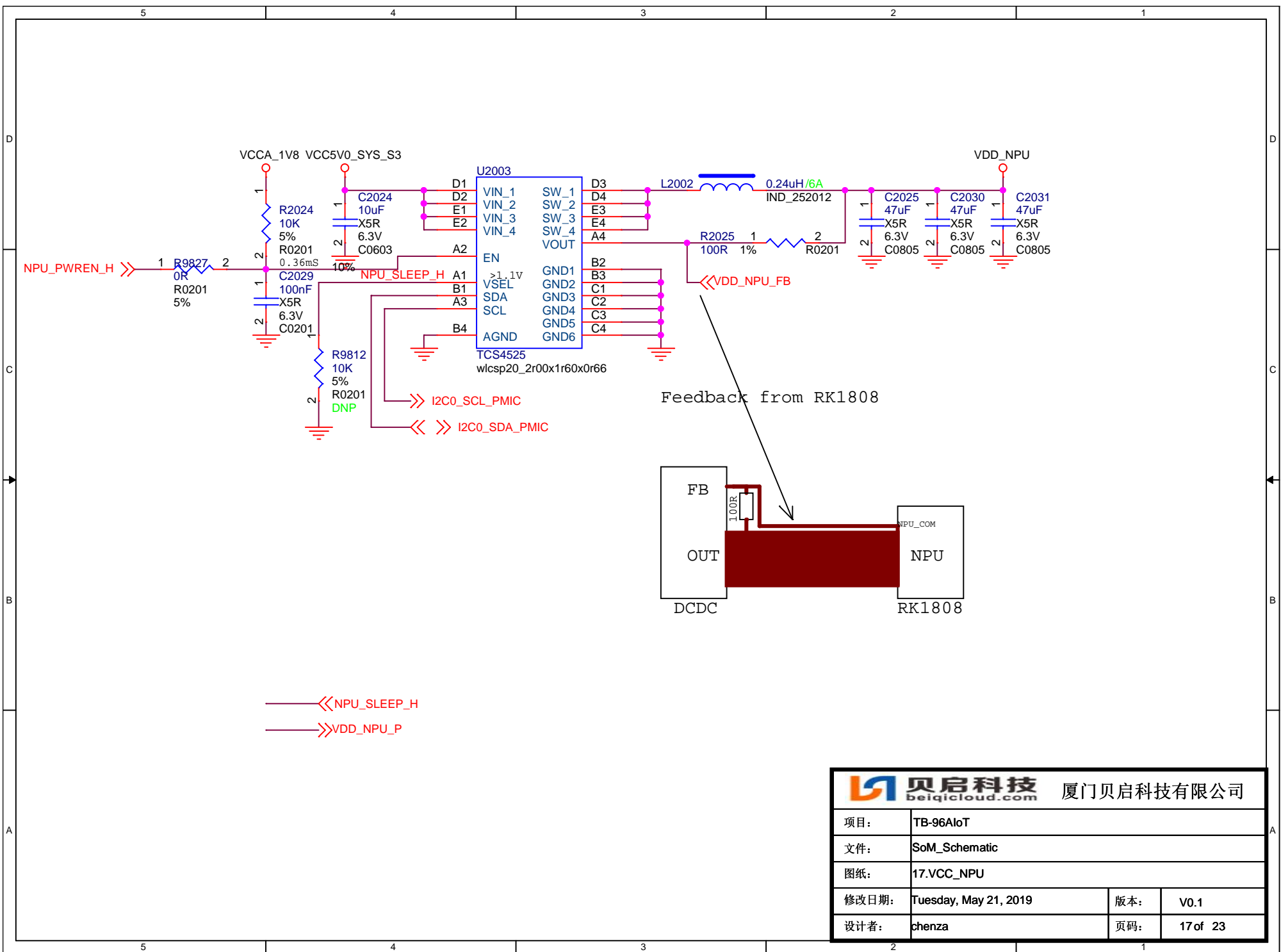


### PMIC RK809-2 CODEC

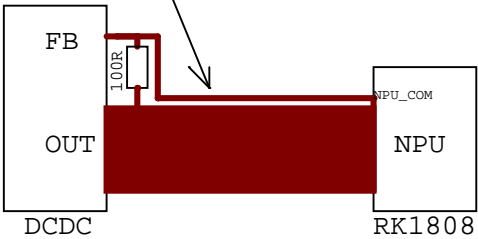


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|       |                       |     |          |
|-------|-----------------------|-----|----------|
| 项目:   | TB-96AIoT             |     |          |
| 文件:   | SoM_Schematic         |     |          |
| 图纸:   | 16.Power-PMIC RK809-2 |     |          |
| 修改日期: | Tuesday, May 21, 2019 | 版本: | V0.1     |
| 设计者:  | chenza                | 页码: | 16 of 23 |



Feedback from RK1808

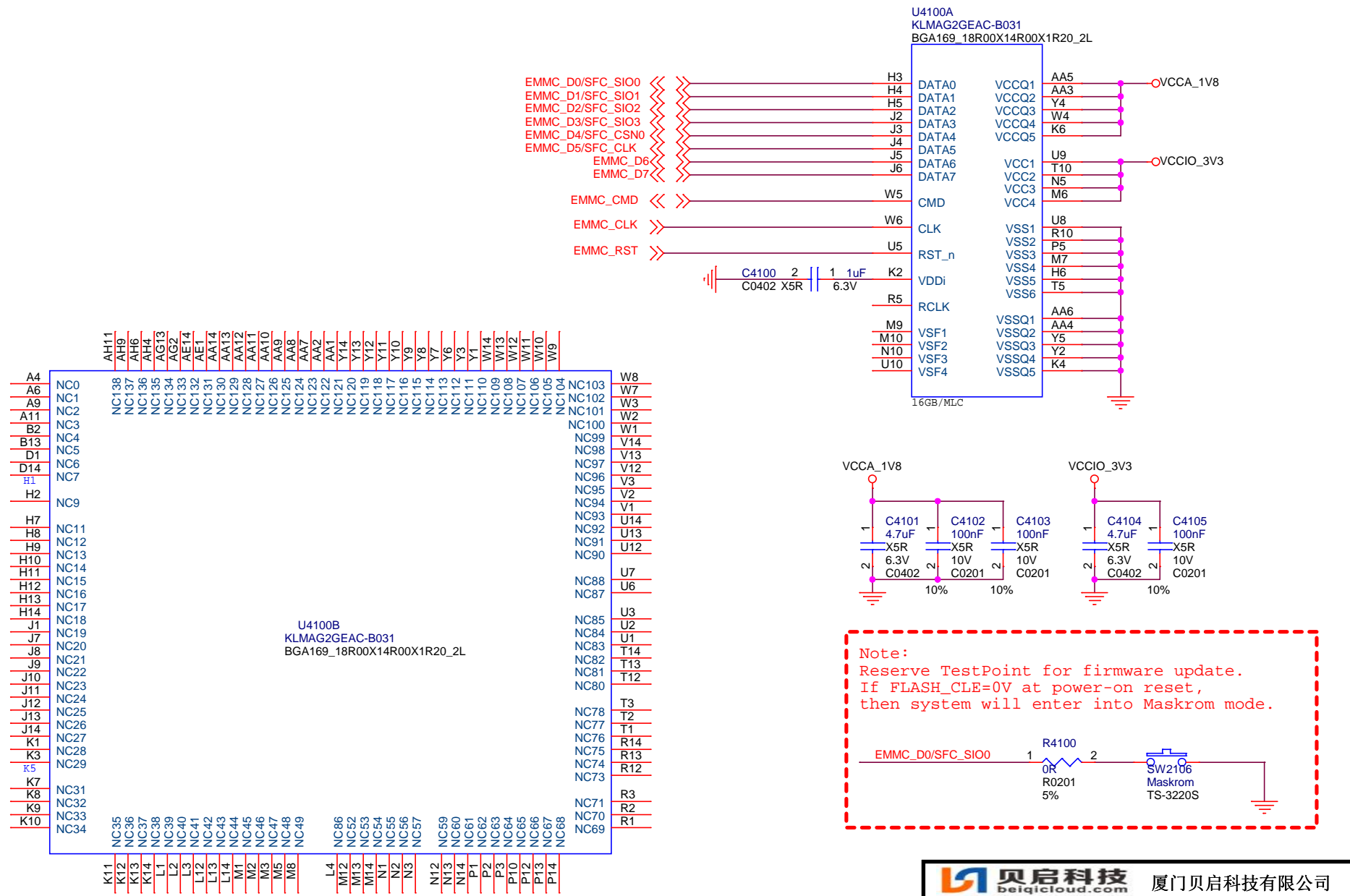


NPU\_SLEEP\_H  
 VDD\_NPU\_P


|                                |                       |     |          |
|--------------------------------|-----------------------|-----|----------|
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| 项目:                            | TB-96AIoT             |     |          |
| 文件:                            | SoM_Schematic         |     |          |
| 图纸:                            | 17.VCC_NPU            |     |          |
| 修改日期:                          | Tuesday, May 21, 2019 | 版本: | V0.1     |
| 设计者:                           | chenza                | 页码: | 17 of 23 |



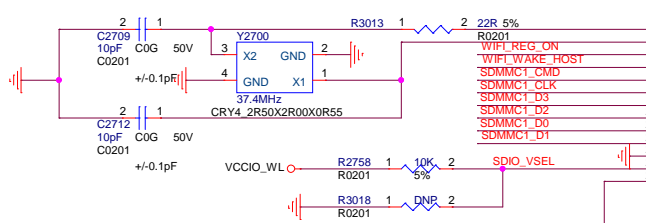
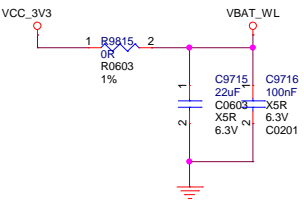
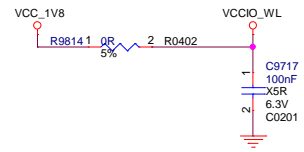
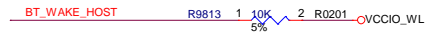
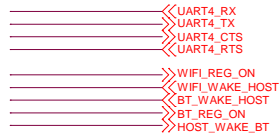
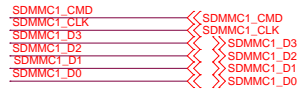
# eMMC



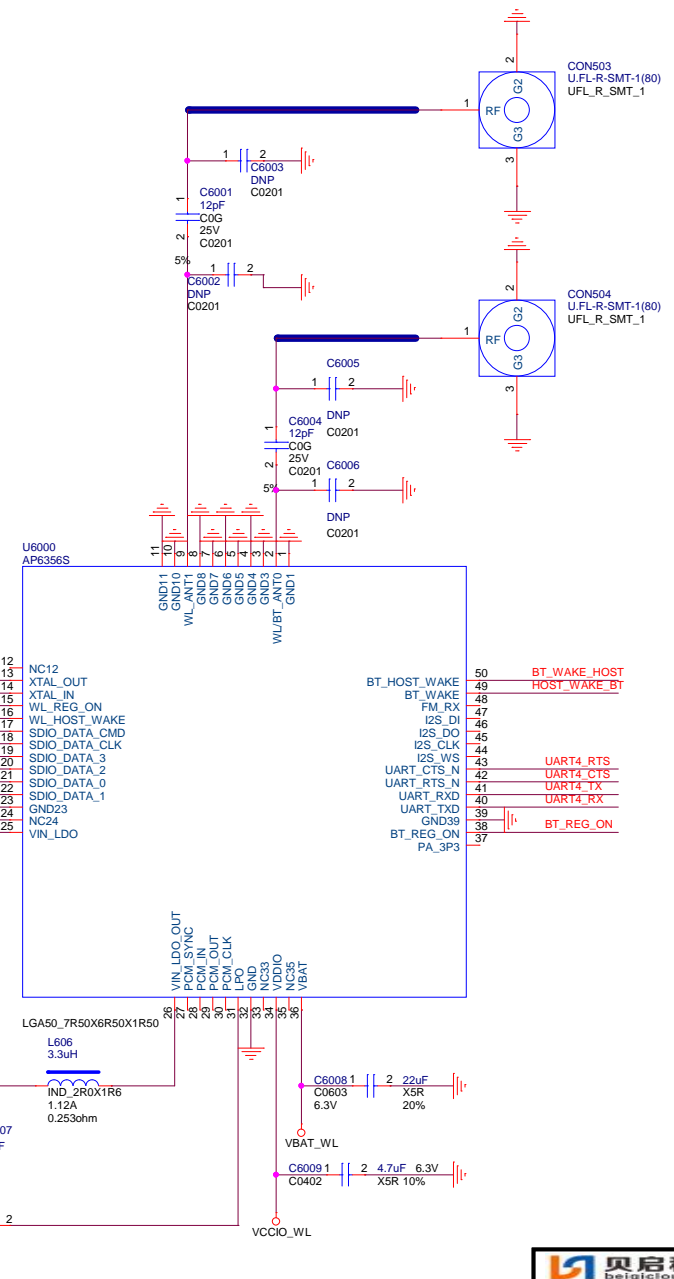
Remind: Refer to the latest AVL for parts selection.

|  |                       |
|--|-----------------------|
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| 项目:  | TB-96AIoT             |
| 文件:  | SoM_Schematic         |
| 图纸:  | 19.EMMC               |
| 修改日期:  | Tuesday, May 21, 2019 |
| 设计者:   | chenza                |
| 版本:  | V0.1                  |
| 页码:  | 19of 23               |

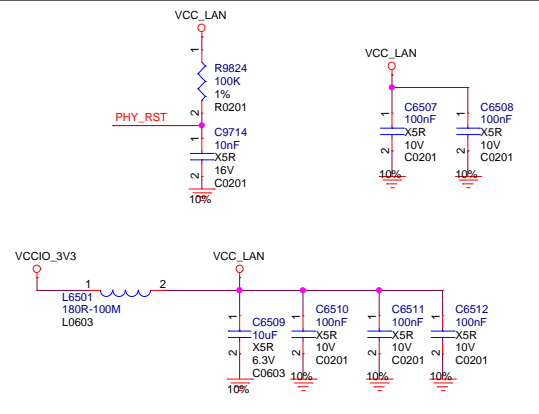
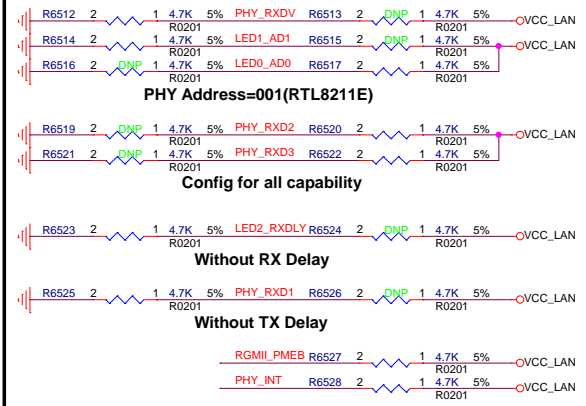
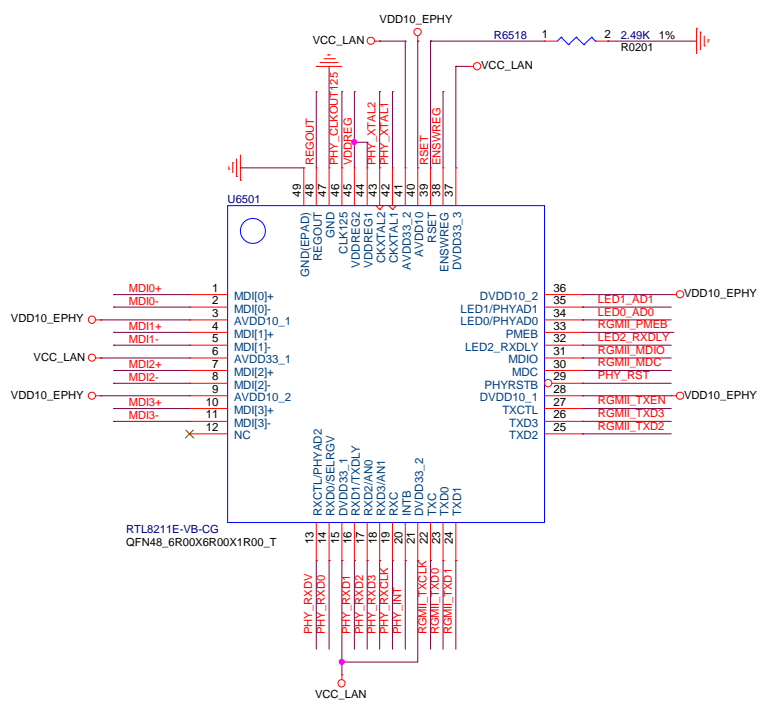
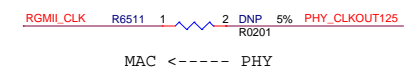
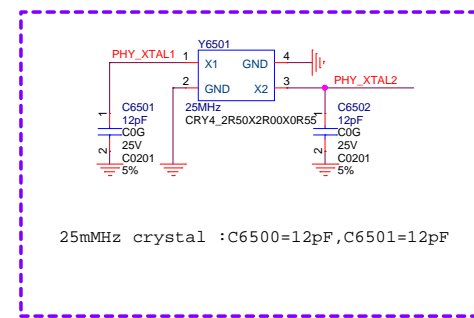
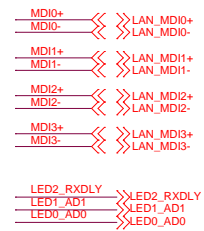
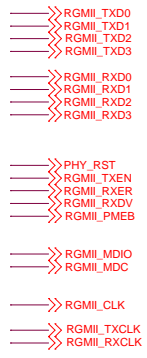
# WIFI/BT MODULE



NOTE:  
L1, rated current 1A  
expectation specification.



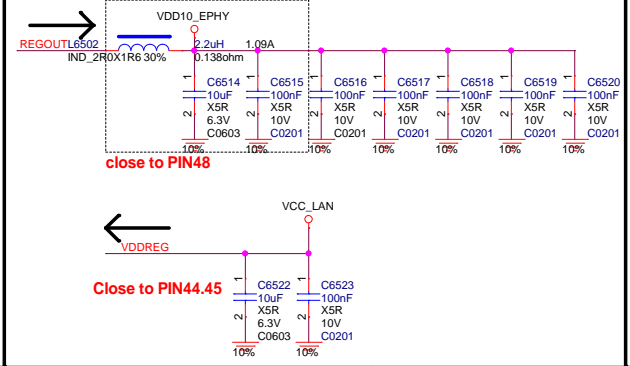
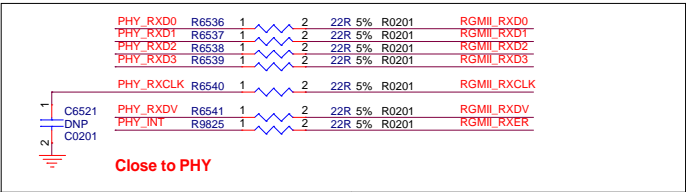
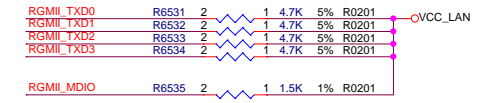
|                              |                         |            |          |
|------------------------------|-------------------------|------------|----------|
| <b>贝启科技</b><br>beiqitech.com |                         | 厦门贝启科技有限公司 |          |
| 项目:                          | TB-96AIoT               |            |          |
| 文件:                          | SoM_Schematic           |            |          |
| 图纸:                          | 20.SDIO WIFI/BT AP63563 |            |          |
| 修改日期:                        | Tuesday, May 21, 2019   | 版本:        | V0.1     |
| 设计者:                         | chenza                  | 页码:        | 20 of 23 |



Connect ENSWREG to AVDD33 to enable Switching regulator or connect ENSWREG to GND to disable Switching regulator.

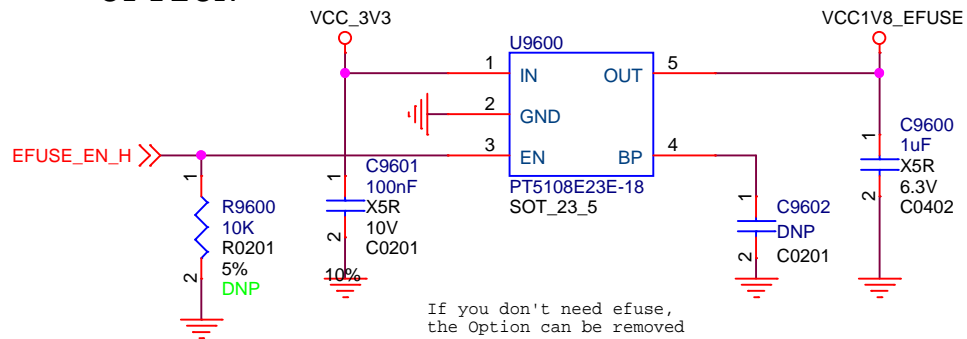
**Pull down for 2.5V RGMII(RTL8211D/8211E)**  
**Pull up for 3.3V RGMII (RTL8211D/8211E)**  
**Pull up 1.5 / 1.8V RGMII (RTL8211E-VL only)**


### RGMII 1000M



|       |                       |              |
|-------|-----------------------|--------------|
|       |                       |              |
| 项目:   | TB-96A10T             |              |
| 文件:   | SoM_Schematic         |              |
| 图框:   | 21.ETHERNET           |              |
| 修改日期: | Tuesday, May 21, 2019 | 版本: V0.1     |
| 设计者:  | chenza                | 页码: 21 of 23 |

# OPTION



|  |                       |     |          |
|--|-----------------------|-----|----------|
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| 项目:  | TB-96AloT             |     |          |
| 文件:  | SoM_Schematic         |     |          |
| 图纸:  | 22.EFUSE              |     |          |
| 修改日期:  | Tuesday, May 21, 2019 | 版本: | V0.1     |
| 设计者:   | chenza                | 页码: | 22 of 23 |

