# S17 Maintenance Guide

| No. | | Version | V1.0 | Editor | Li Yan |
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# Content

# I. Maintenance Tools

1. General-purpose electric screwdriver
2. Multimeter, tweezer, V9-v1.2 hashboard tester, a set of S17 hashboards housing with power supply
3. Heat gun (soldering temperature should be $260 \pm 2$ degrees Celsius)
4. Thermostat soldering iron (soldering temperature should be 300-350 degrees Celsius)
5. Eco-friendly scaling powder, lead-free and low-temperature (melting point is 150 degrees Celsius) solder wire, anhydrous alcohol, cleaning water
6. OM550 low temperature solder paste, BM1397AE tin grinder and tin stencils

# II. The Component Structure of Hashboard
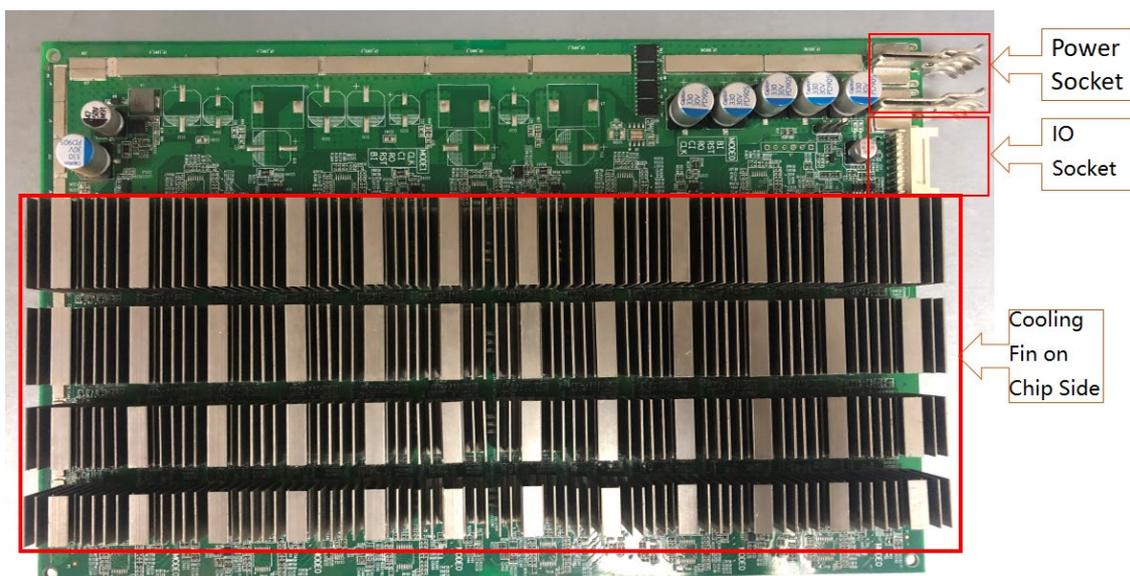
# III. Signal Transmission Circuit

1.  Signal transmission channel: signal CLK-RST-BO-CO transmits from No. 1, No. 2 … to No. 48 chip, while RI signal returns from No. 48 to No. 1 chip. See below fig.
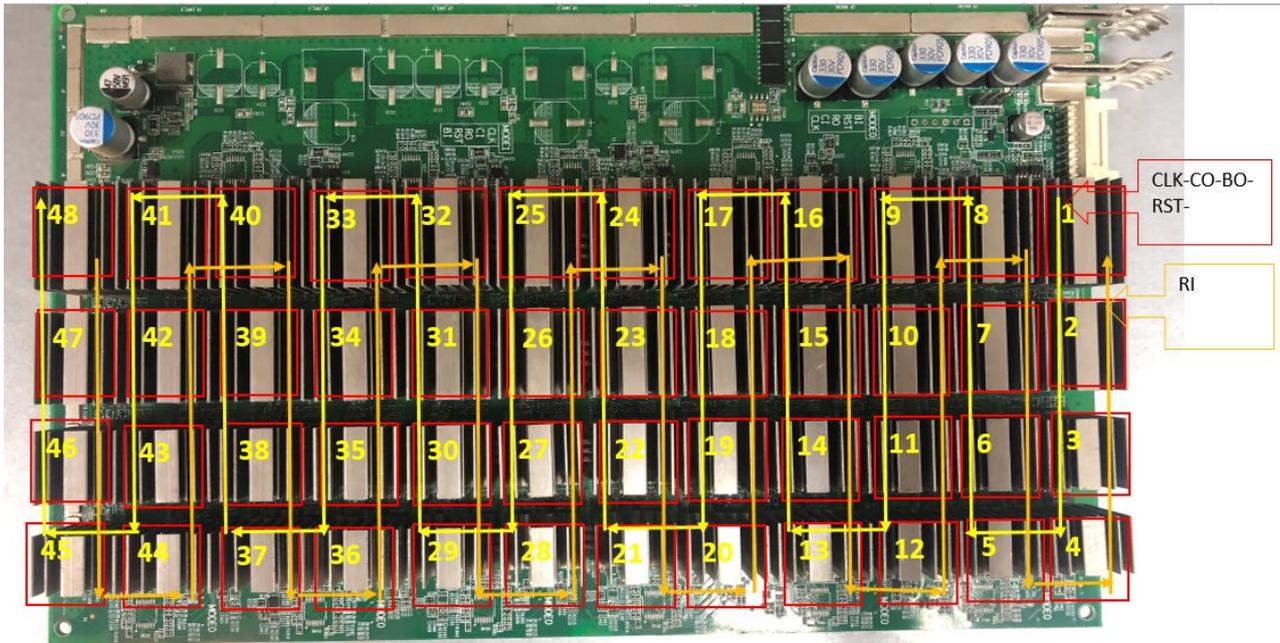


2.  The identification and sequence of signal test points (the hashboard has 48 chips, 12 voltage domains in total), see below fig.
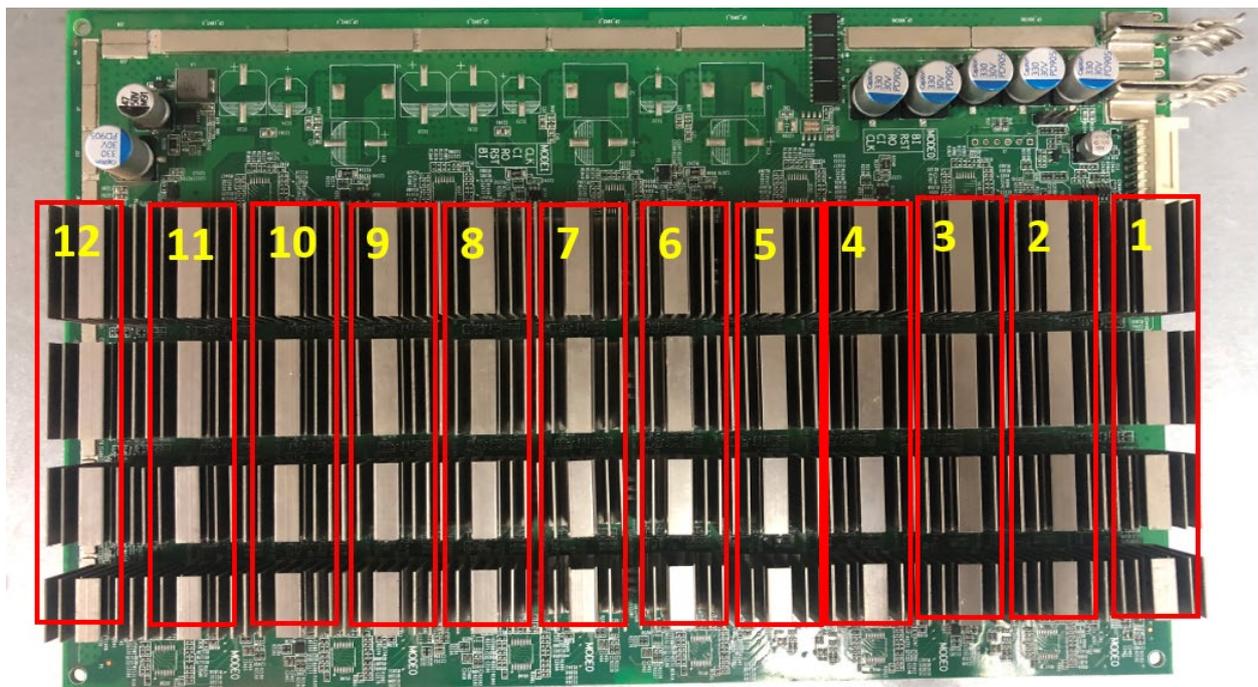


The Distribution and Sequence of Voltage Domain Test Points
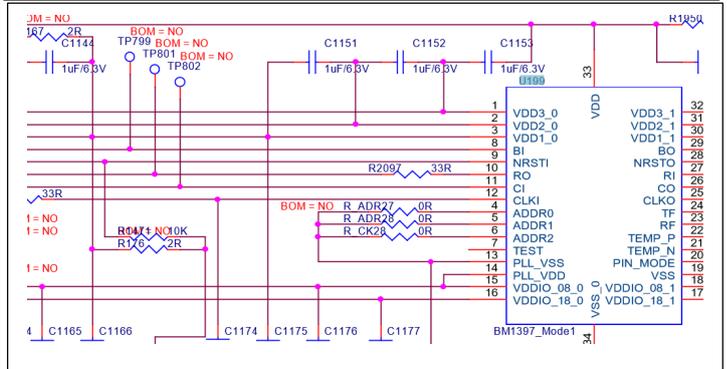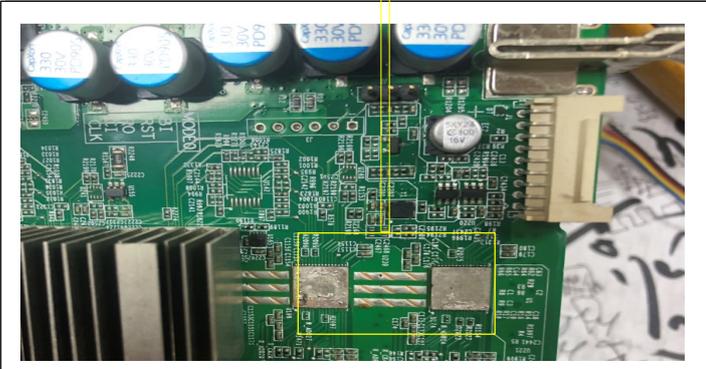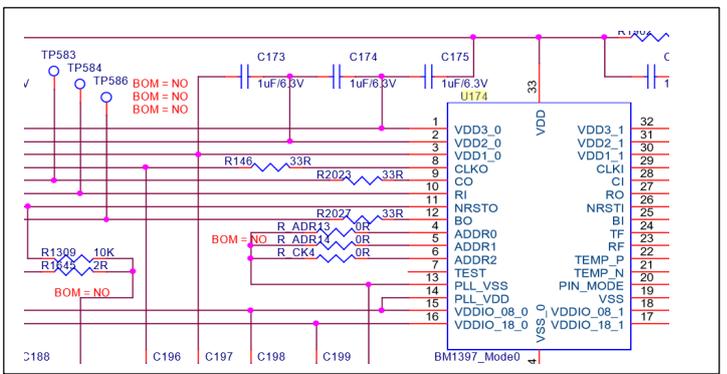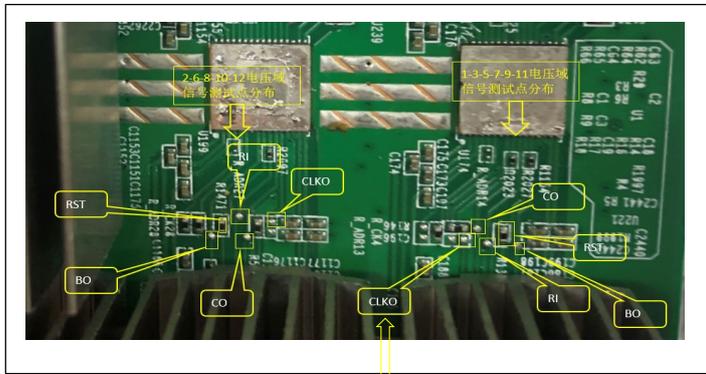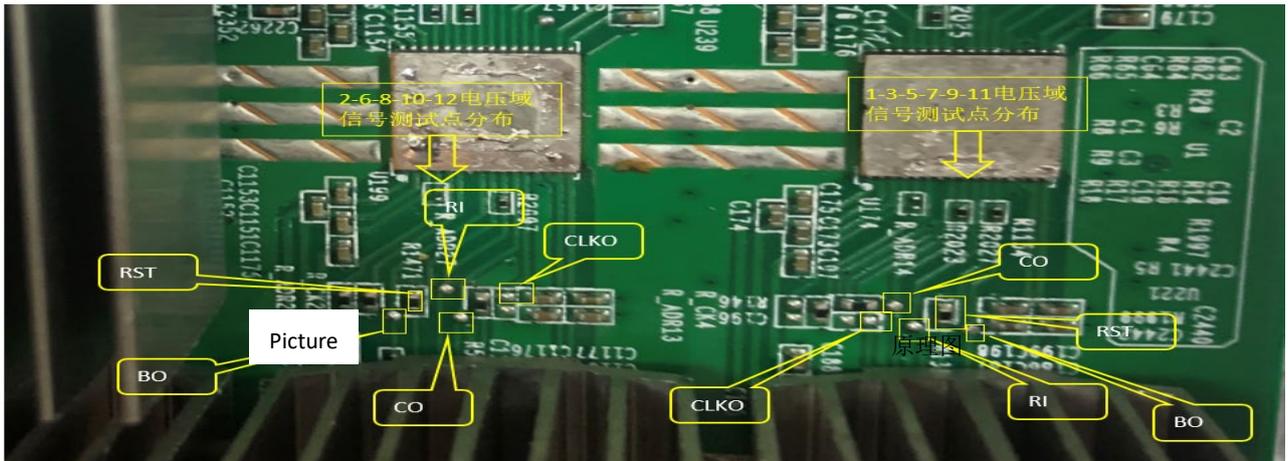
3. The signal communication circuit of IO socket to chips

J1-IO Socket Picture　　　　　　　　　　　　　　J1-IO Socket Schematic Diagram
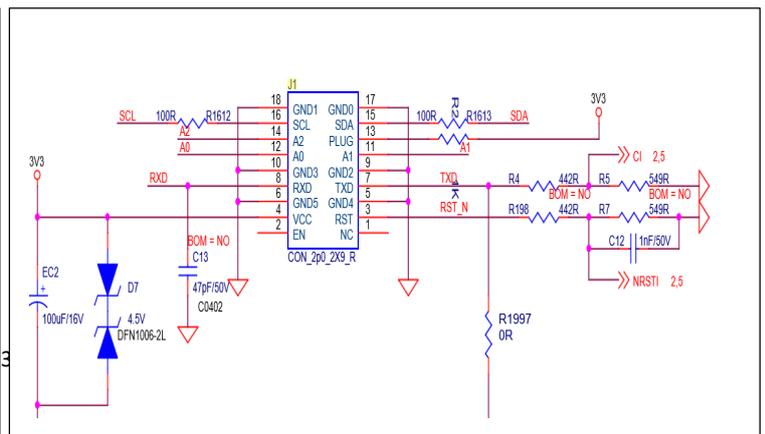
RX and RO Conversion Schematic Diagram
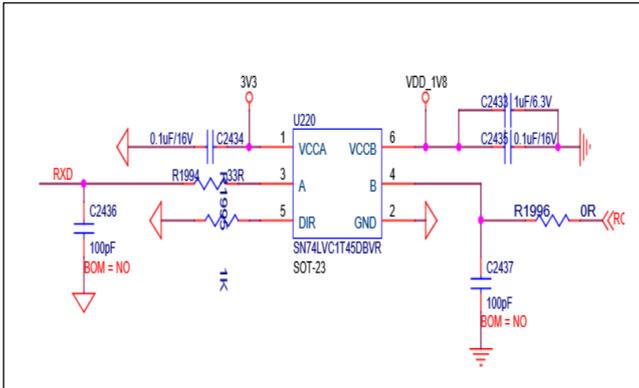


RX and CI Signal and Chip Transfer Schematic Diagram
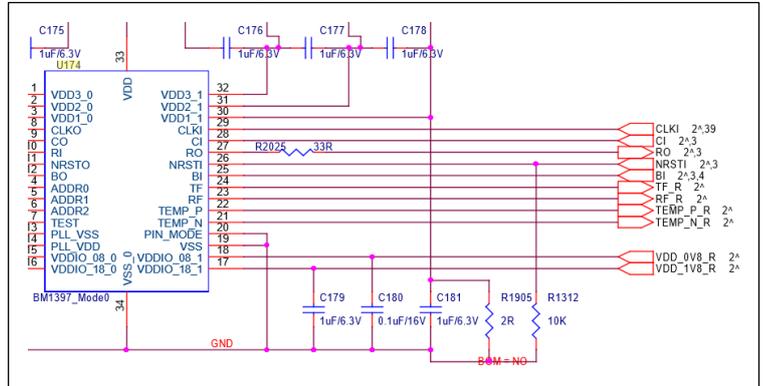


# IV. Power Circuit

1. The power supply voltage of each board: (the voltage output of S17 board test is 18.5V). There are 12 voltage domains in total and the voltage of each two voltage domains is 1.55v.
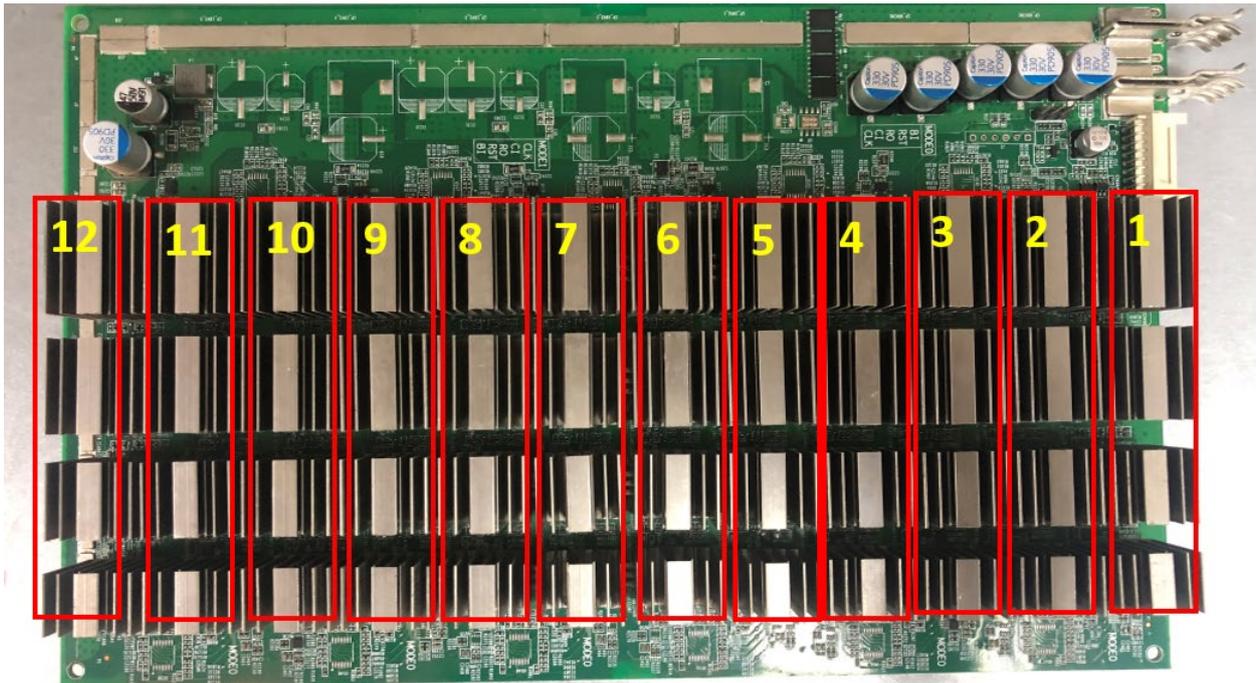
# V. Case Analysis of Maintenance

# (Troubleshooting Examples of Single Board Test)

## 5.1 Single board test asic=0

Malfunction analysis:

1. Whether the ribbon cable of hashboard tester is connected well with hashboard.

2. If yes, S17 hashboard J6-J7 should have 18.5V voltage during the tester test.

3. During the tester test, detect whether there is voltage or not among 12 voltage domains.

3.1 If voltage domain has no voltage, check if the operating voltage of pin 4 of Q7, Q8, Q9, Q11 is low level 0V; if it is high level, check if the pin 1 of Q10 is high level 3.3 V; if Q10 does not have 3.3V voltage, it means U3-PIC loses firmware or has no power supply.



PIC Schematic Diagram
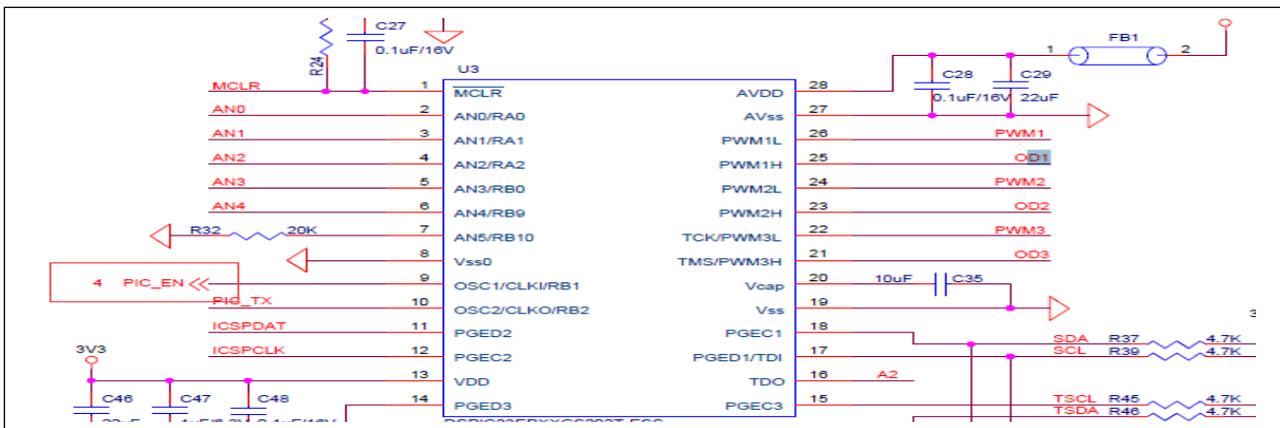


18.5V Output Control Circuit
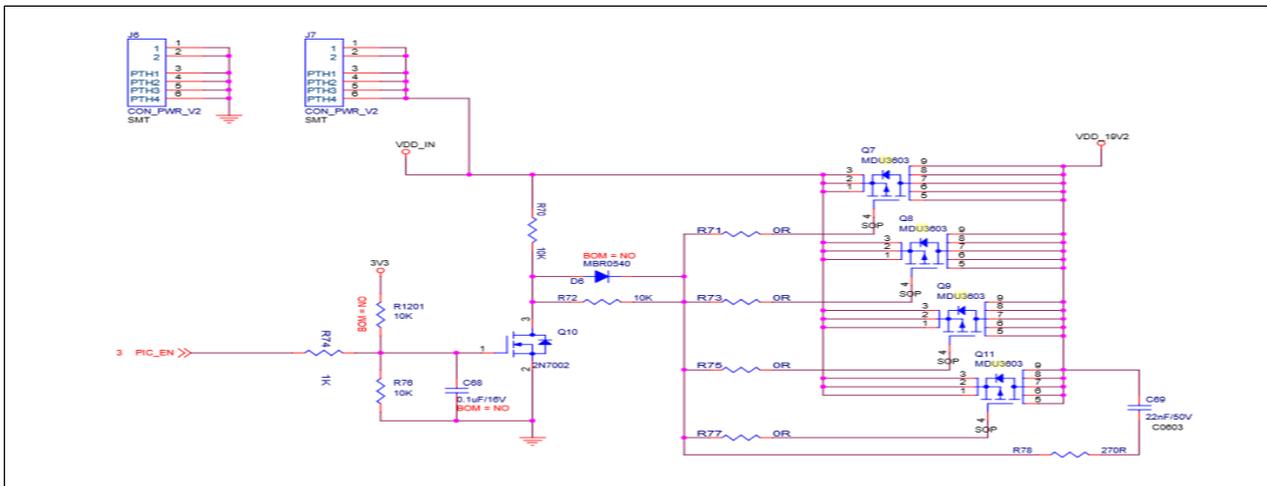
3.2．If power supply is normal and voltage domains also have voltages, detect the RI signal of chip to see whether RI signal has 1.8V voltage. Detect RI signal from the test point of the last chip. If the last chip has, detect No. 20 chip to see whether it has RI-1.8V, and so forth, until find the chip that has no RI output voltage. Firstly, detect the 1.8V power supply of this chip. If there is no 1.8V power supply, detect 1.8V power supply circuit. 1.8V power supply circuit supplies power to LDO pin 1 via voltage division of voltage domains, LDO pin 5 outputs 1.8V voltage (each voltage domain has a -1.8V LDO to supply power for chip). No output means the malfunction of this LOD. If there is no problem with 1.8V, detect the resistance to ground of test point and compare with OK board after power cutoff, to check for resistance anomaly. If the resistance and soldering are both normal, it should be the anomaly of this chip. (Remove the chip, re-solder the chip to a good board and test again. If there is still no RI signal, it means the chip is damaged and just replace the chip).

1.8V Power Supply Circuit
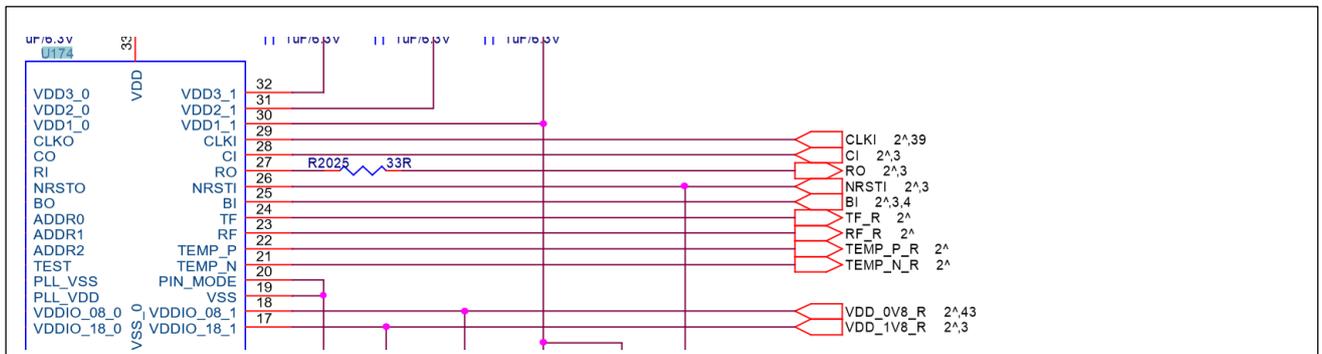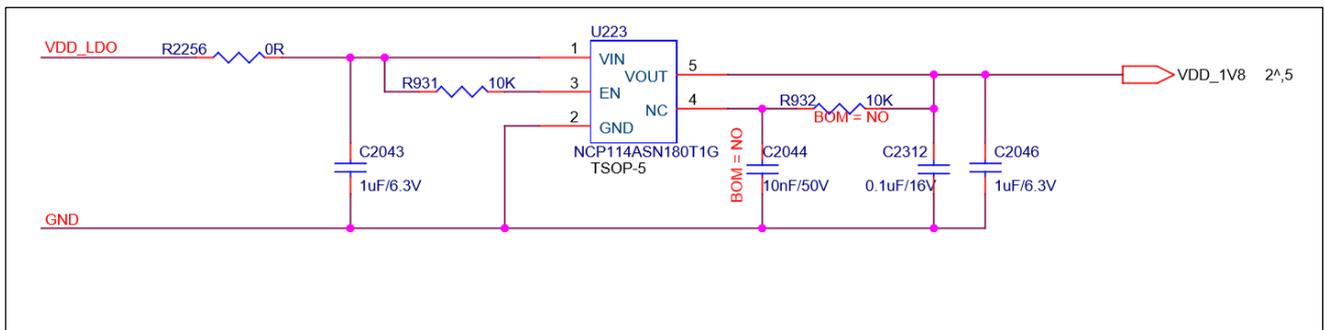




## 5.2 The phenomenon of malfunction ASIC=7

Analysis: ASIC=7

1. If 7 chips can be found in single board test, RI signal is normal. If No.8 chip cannot be found, we will directly detect the U198-CLK-RST-CO voltage of No. 7 chip to see if the power supply is normal. If CLK does not have 0.8V voltage, check the supply circuit of CLK.

2. CLK circuit analysis: if CLK does not have 0.8V, check if the 0.8 V power supply of the voltage domain of the poor chip is normal. 0.8V power supply circuit is obtained via voltage division of voltage domains, the same as the power supply of 1.8V. Pin 5 outputs 0.8V. The maintenance method of 1.8V can be regarded as a reference (note: 2 chips out of 4 chips in each domain of S17 output 0.8V LDO power supply, and each LDO supplies 2 chips).

0.8V Power Supply Schematic Diagram
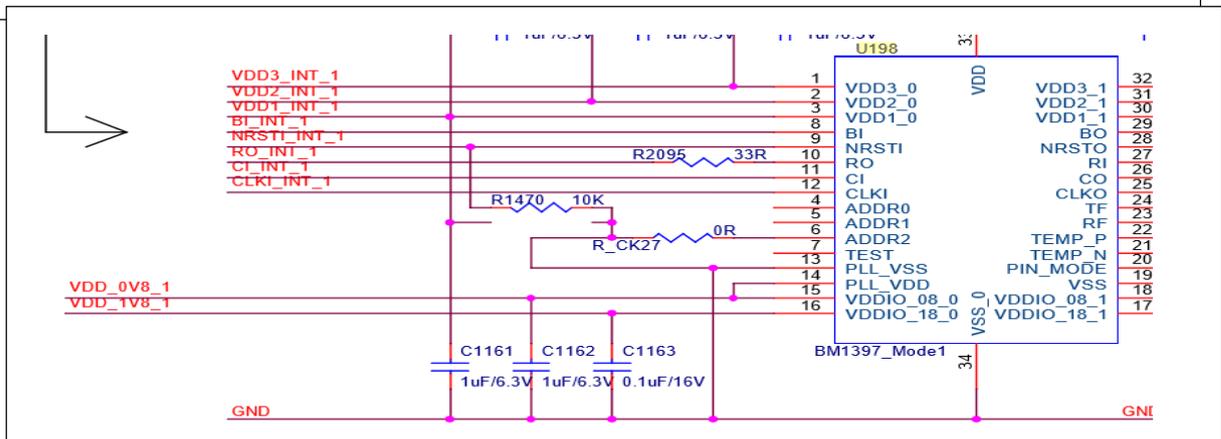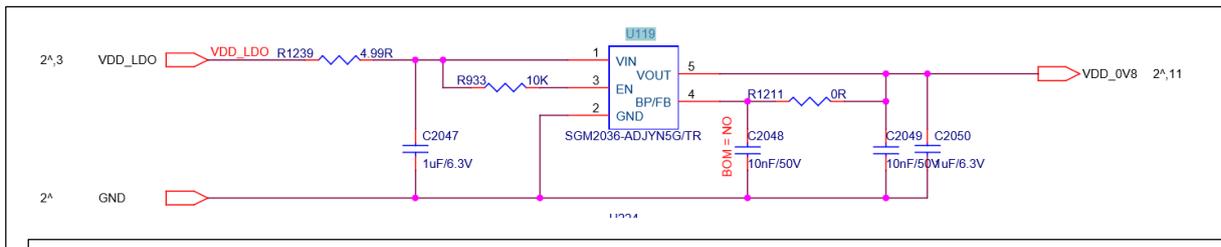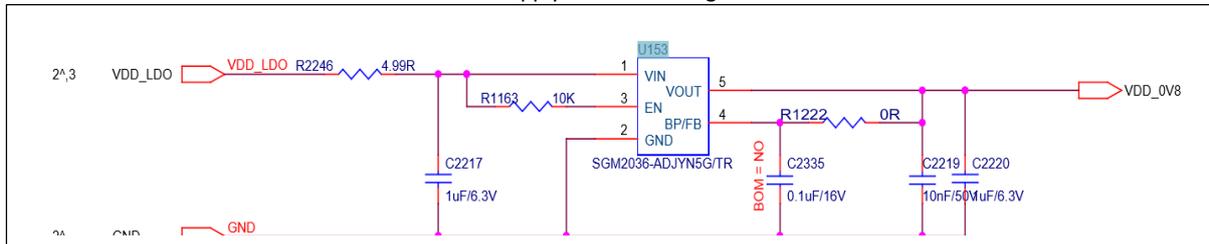


If 0.8V power supply circuit does not have 0.8V output, check if the power supply of 0.8V LDO has about 3.2V power supply voltage. If yes, check whether LDO is in a condition of pseudo soldering/short circuit. If it has 0.8V output, check the resistance to ground of this chip. If the resistance is normal, it should be chip anomaly.