POWER 时序

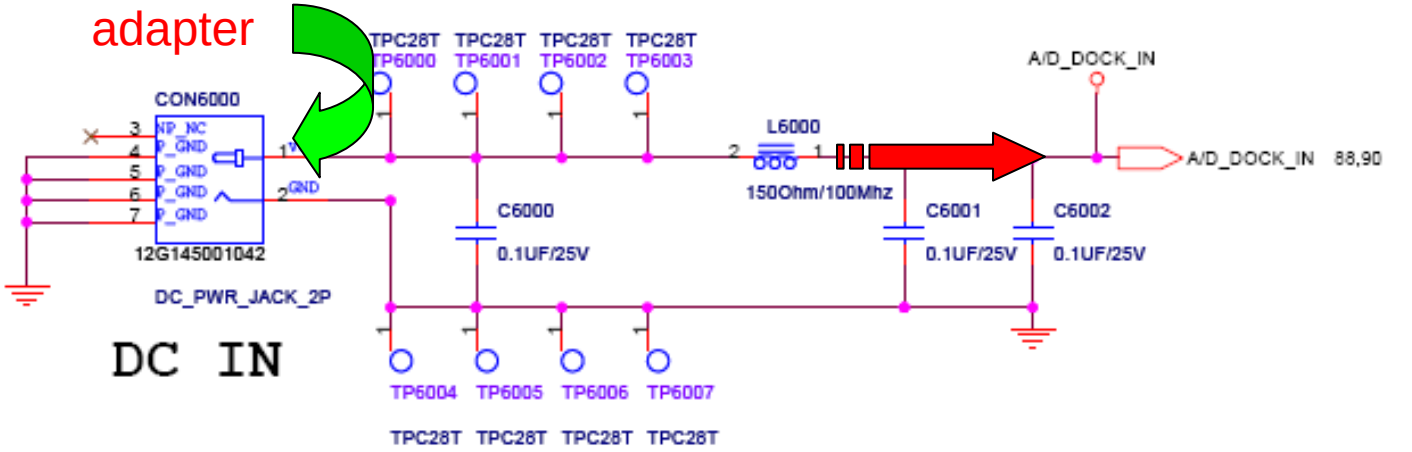
部門：FAE

X B H

dobe Acrobat 7.0
Document

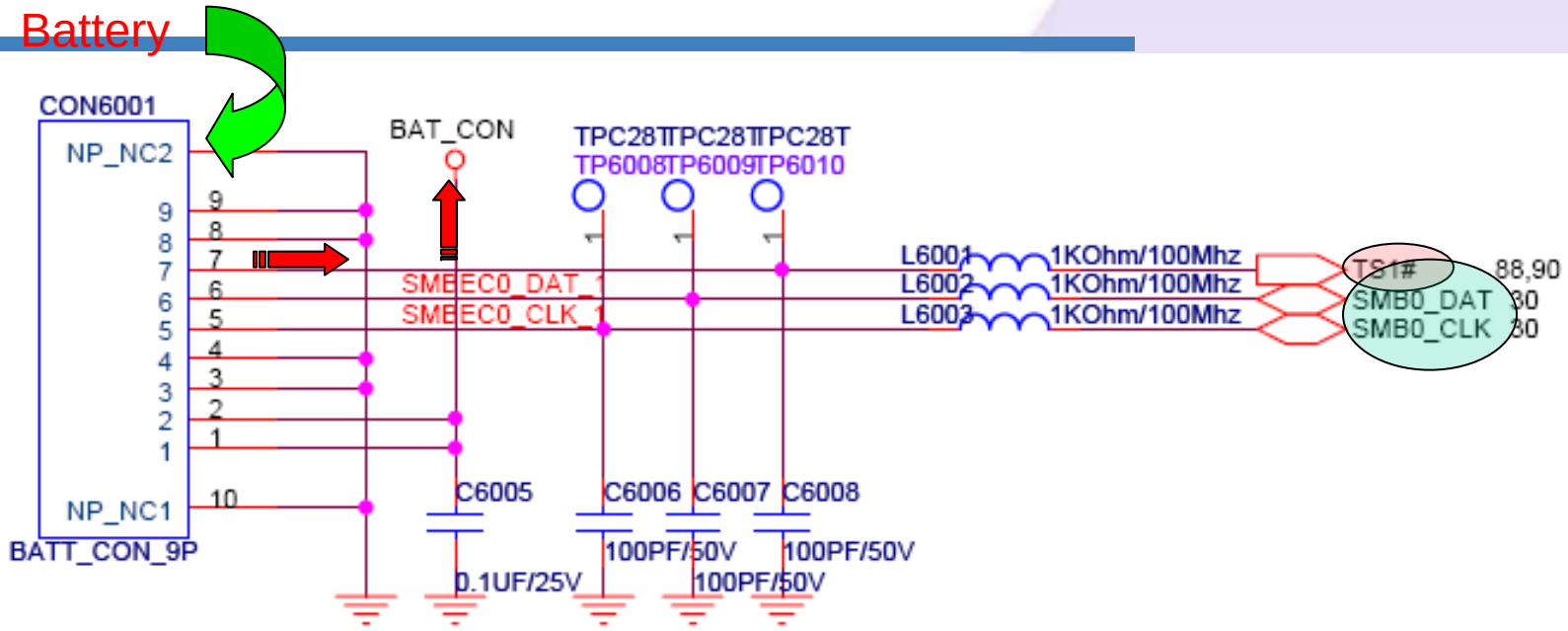
HEART OF TECHNOLOGY

1.电源进入(adapter)



当adapter插入时产生A/D_DOCK_IN(19V)

1.电源进入(Battery)



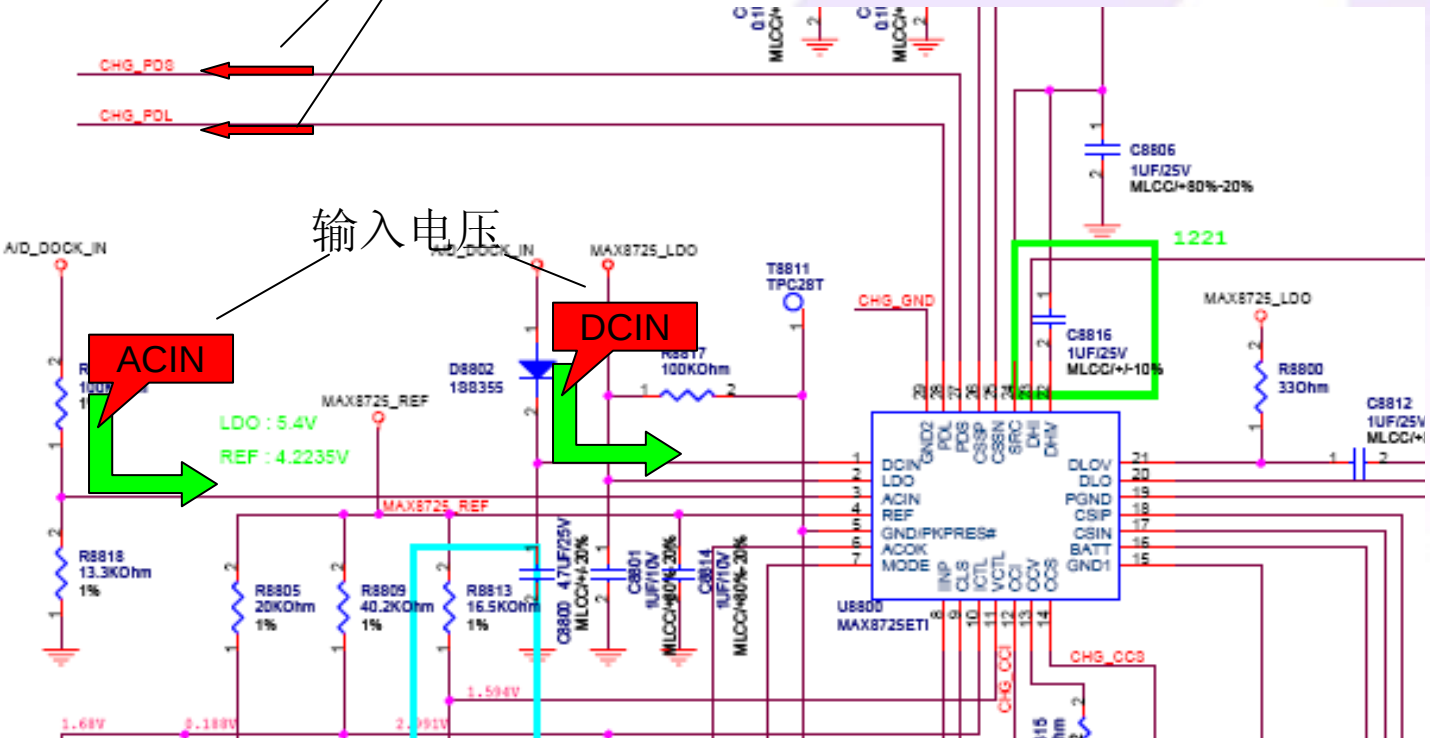
★ 当Battery插入时产生BAT_CON.(16.8V)

★ TS1# 侦测电池插入.此信号为高电平,当插入电池时为低电位.

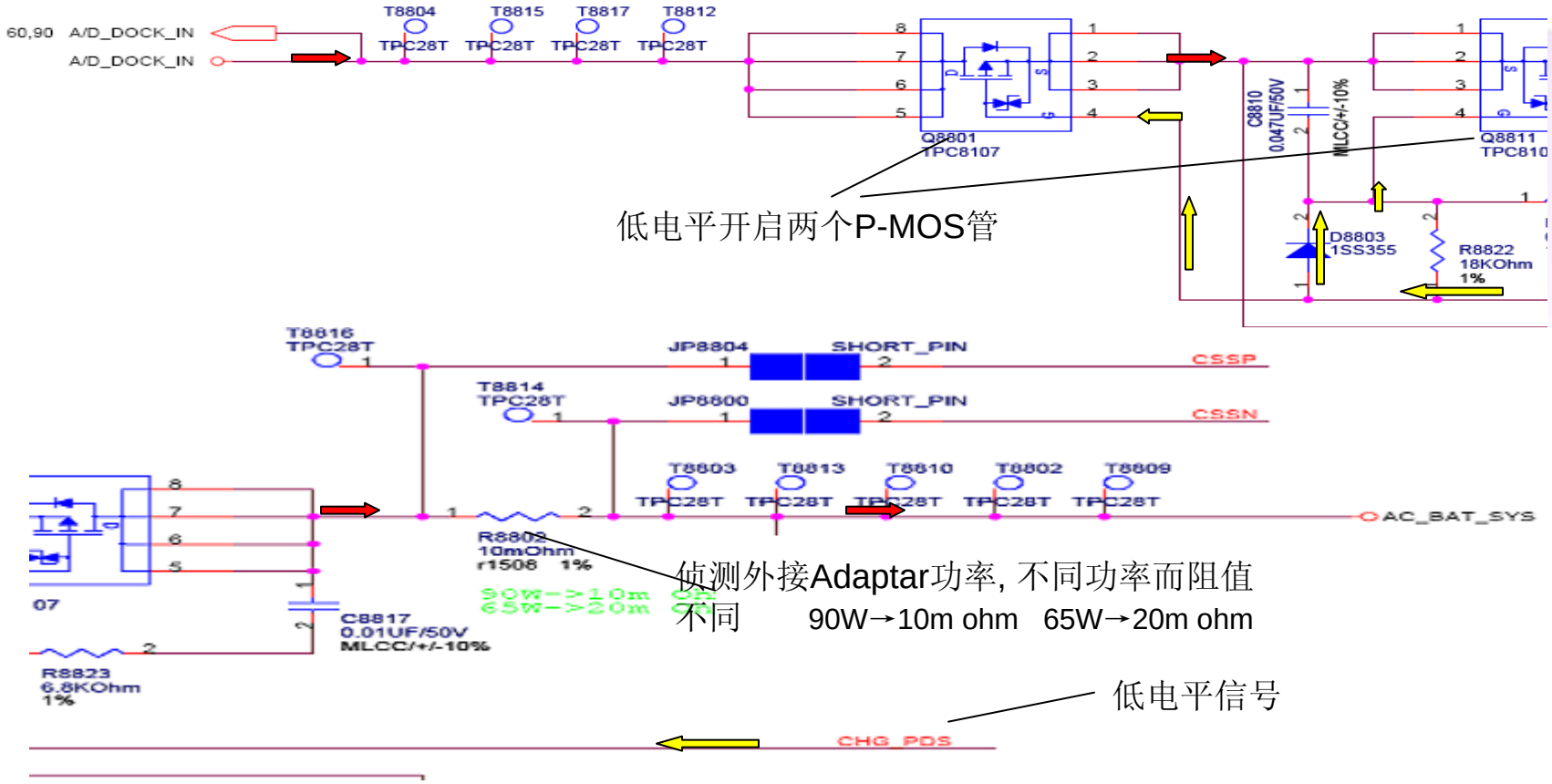
★ SMB0_DAT
SMB0_CLK
} 这两个信号主要是侦测电池电量

POWER_CHARGER

- 输出低电平信号CHG_PDS开启A/D_DOCK_IN转化AC_BAT_SYS
- 输出低电平信号CHG_PDL开启BAT_CON转化AC_BAT_SYS



POWER PATH
A/D_DOCK_IN→AC_BAT_SYS



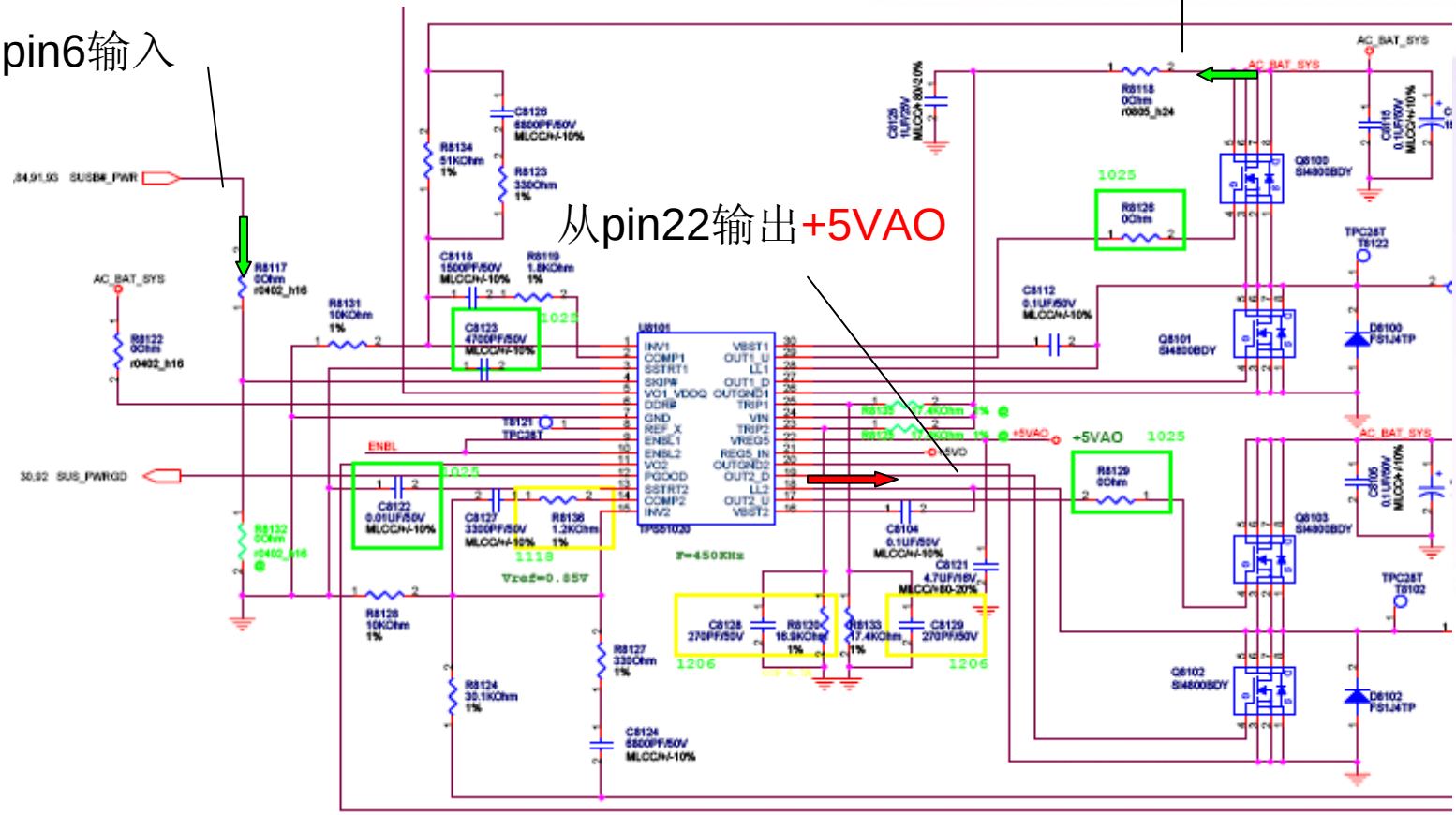
+5VAO

AC_BAT_SYS

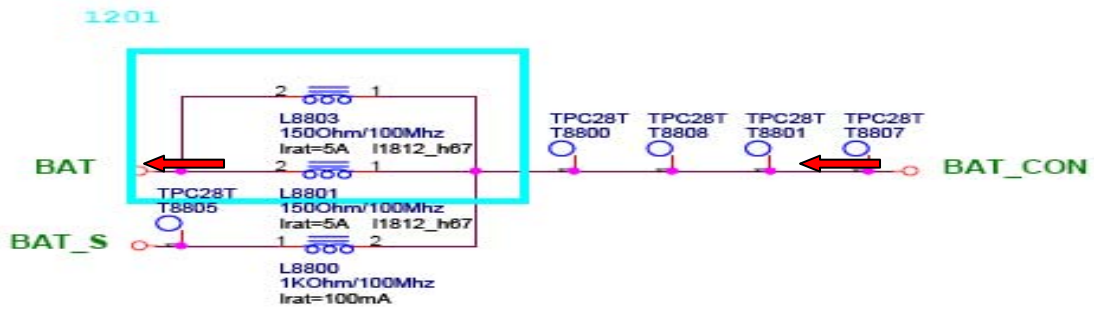
从pin24输入

AC_BAT_SYS

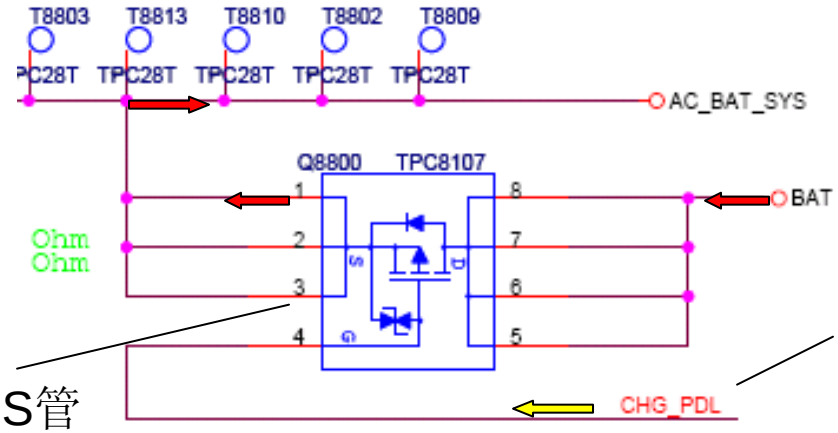
从pin6输入



BAT_CON→AC_BAT_SYS



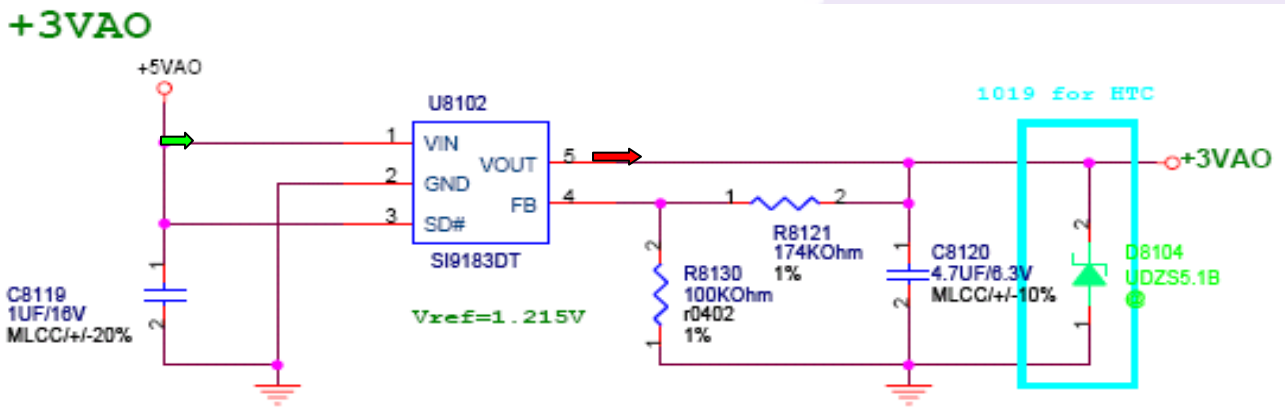
BAT_CON经过滤波电感产生BAT



开启P-MOS管

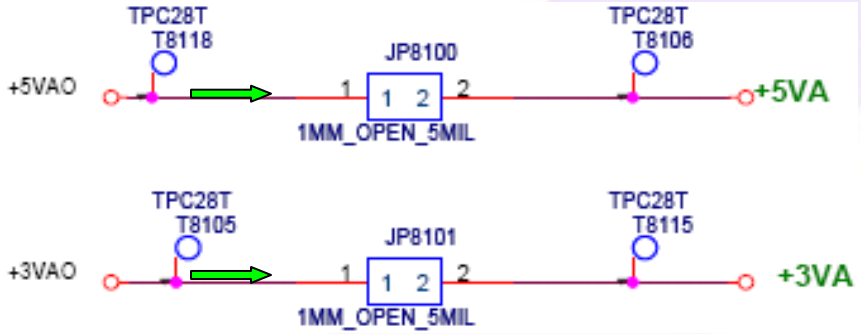
低电平信号

+3VAO



- 这是一个线性稳压芯片,+5VAO从pin1输入,在pin3做一个shut_down#信号,从pin5输出+3VAO
- 反馈回路:+3VAO经过电阻R8121,R8130分压反馈给U8102 pin4,使芯片pin5输出一个稳定的+3V
- 反馈电压Vref= $\frac{100K\Omega}{100K+174K\Omega} \times 3V = 1.094V$

+5VA　+3VA



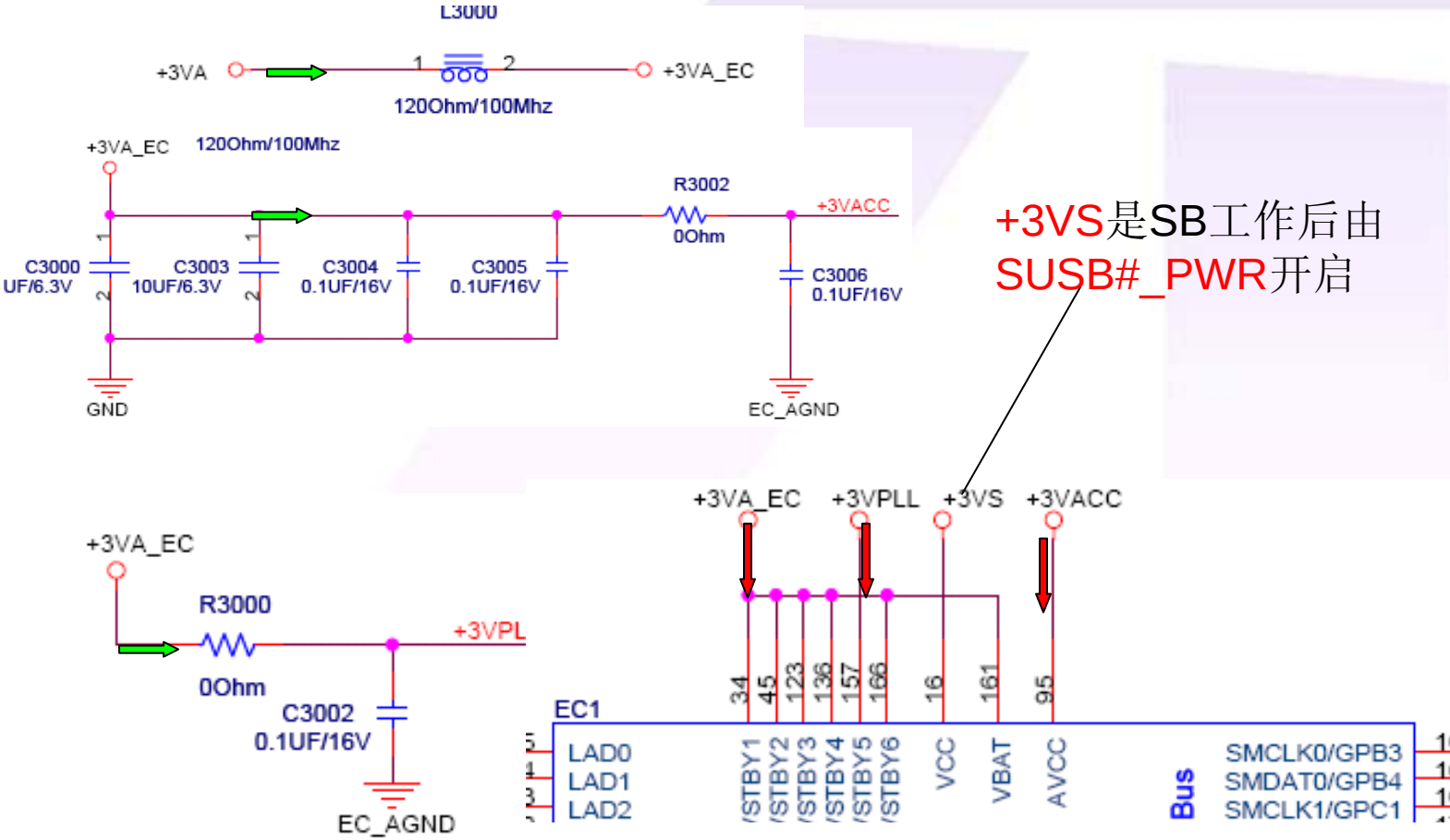
★ +5VAO经过隔离点产生+5VA

★ +3VAO经过隔离点产生+3VA

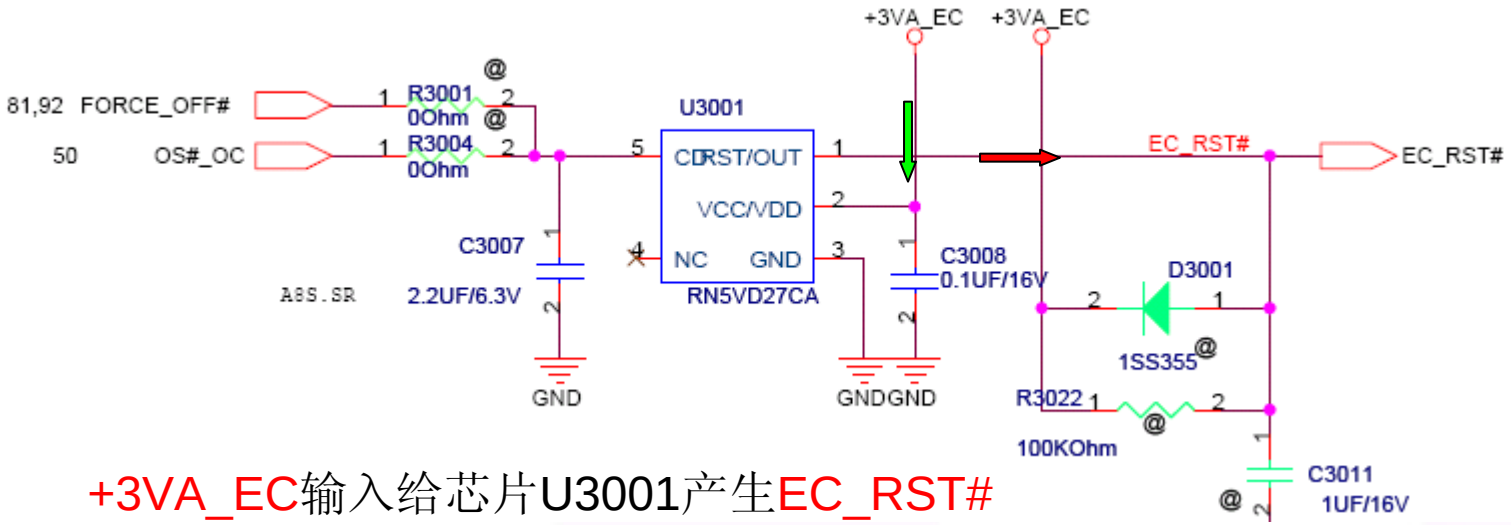
+3VA主要用于EC工作电压

★ 隔离点的作用：以目前做法主要用于Debug,当某一电压有问题时,有时维修人员较难去区分是前级线路未输出电压或是前级已经输出但被后级线路将电压拉掉,此时隔离点用烙铁挑开,再去量测前级线路是否有输出,若无输出则先往前级线路寻找,反之往后级线路寻找

EC - 工作电压

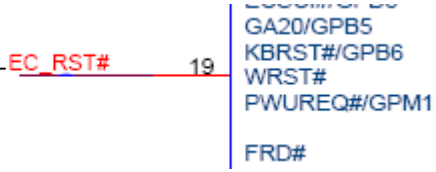

L3000
+3VA
1
2
+3VA_EC
120Ohm/100Mhz
+3VA_EC
120Ohm/100Mhz
R3002
+3VACC
0Ohm
C3000
UF/6.3V
C3003
10UF/6.3V
C3004
0.1UF/16V
C3005
0.1UF/16V
C3006
0.1UF/16V
GND
EC_AGND
+3VS是SB工作后由
SUSB#_PWR开启
+3VA_EC
R3000
+3VPL
0Ohm
C3002
0.1UF/16V
EC_AGND
+3VA_EC
+3VPLL
+3VS
+3VACC
EC1
LAD0
LAD1
LAD2
/STBY1
/STBY2
/STBY3
/STBY4
/STBY5
/STBY6
VCC
VBAT
AVCC
Bus
SMCLK0/GPB3
SMDAT0/GPB4
SMCLK1/GPC1
34
45
123
136
157
166
16
161
95

EC - RESET

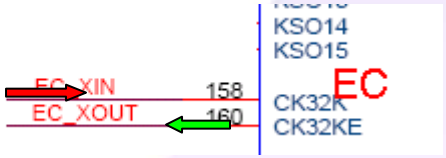


+3VA_EC输入给芯片U3001产生EC_RST#

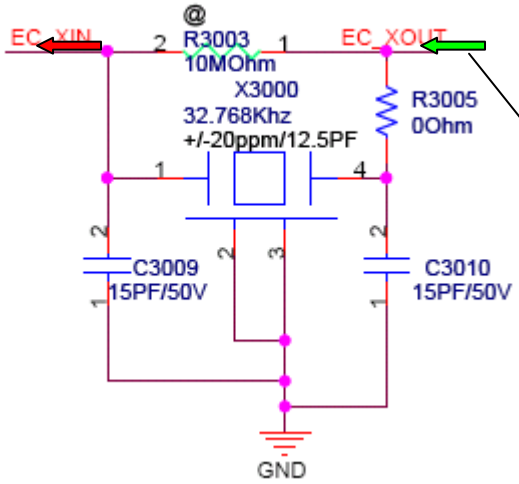
从pin19输入EC



EC-CLOCK



当EC接收到工作电压后就开始从pin160发出EC_XOUT



给晶振提供电压使其产生32.768KHz的频率给EC工作

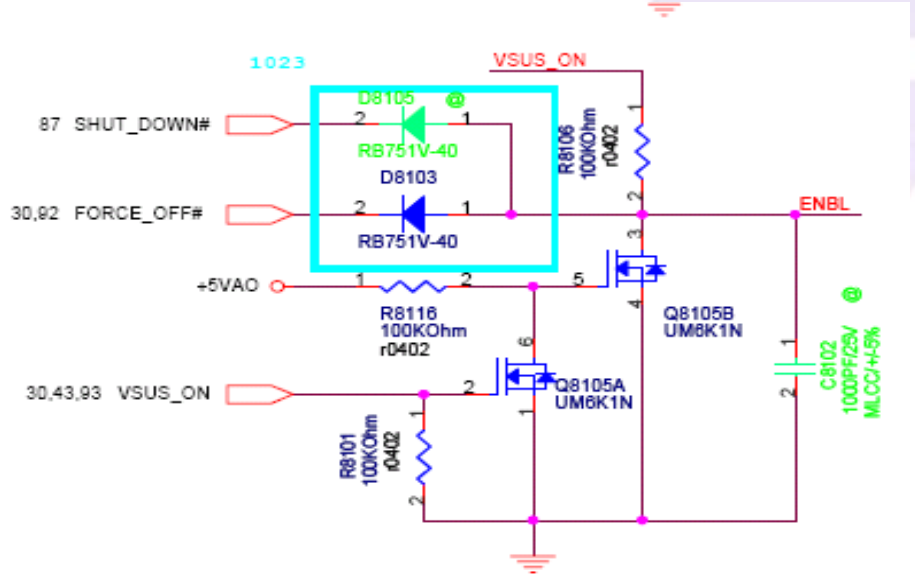
VSUS_ON

- 当EC工作正常后会产生VSUS_ON高电平信号

  VSUS_ON将作为后面开启电压的Enable信号

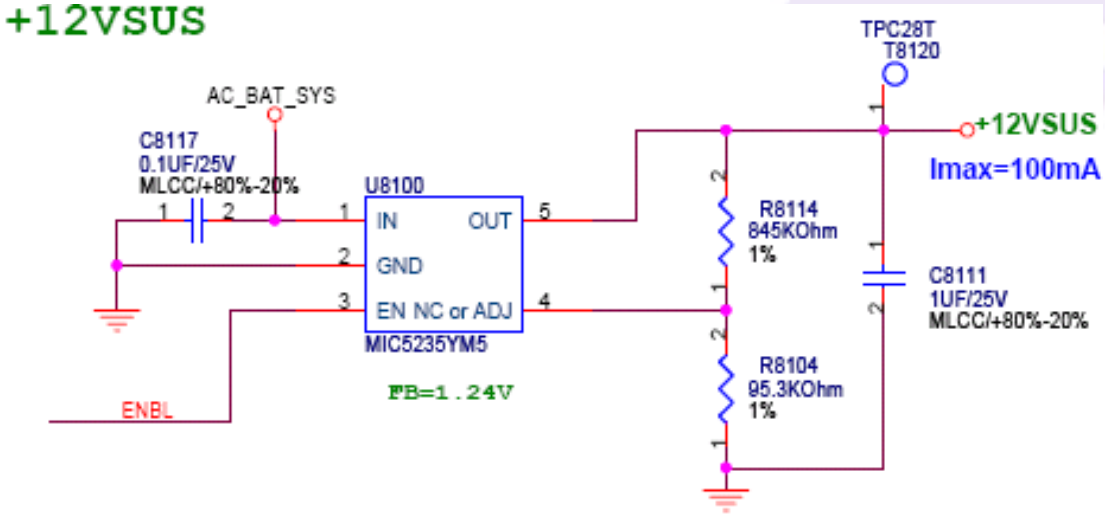
- VSUS_ON理论上是EC产生,但是它要与BIOS进行正确的AD交换后才会产生.

VSUS_ON→ENBL



- ★ VSUS_ON是高电平导通Q8105A使Q8105B关闭,VSUS_ON经过电阻R8106产生ENBL信号
- ★ FORCE_OFF#是强制关机信号当为低电平时D8103导通拉底VSUS_ON,使其无法开启后面电压.(FORE_OFF#产生)

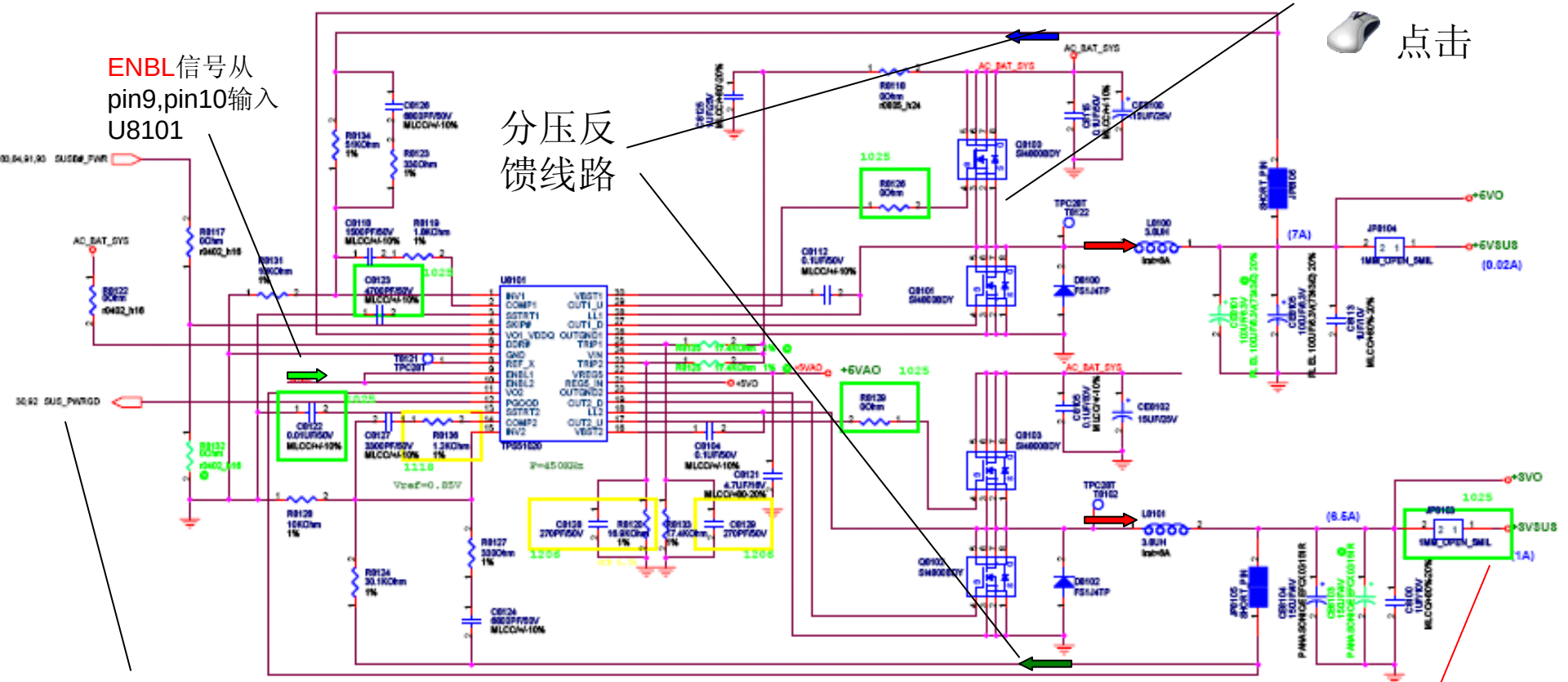
+12VSUS



- 这是一个线性稳压芯片AC_BAT_SYS从pin1输入, 从pin5输出+12VSUS
- 反馈回路:+12VSUS经过电阻R8114,R8104分压反馈给U8100 pin4, 使芯片pin5输出一个稳定的+12V
- 反馈电压Vfb= $\frac{95.3K\Omega}{95.3K\Omega+845K\Omega} \times 12V = 1.21V$

SUS_PWRGD

High-Low Side



当输出电压+3VSUS +5VSUS正常时芯片就输出SUS_PWRGD

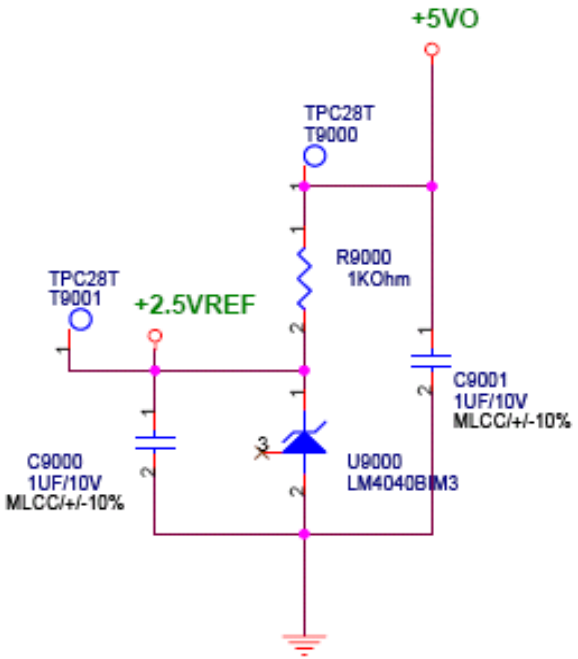
返回南桥

返回POWER GOOD DETECTER

+3VSUS

南桥开机条件之一

2.5VREF



- +5VO经过电阻R9000和稳压二极管U9000产生+2.5VREF
- 电阻R9000的作用:①分压, ②限流
- 稳压二极管的工作原理:利用二极管的反向击穿特性,在端处会产生一个稳定的电压(+2.5VREF),常作为参考电压;稳压二极管电流越大则稳压效果越好,但电流过大超过额定功率则会使二极管损坏,所以必须串连一个电阻(R9000)做限流作用.

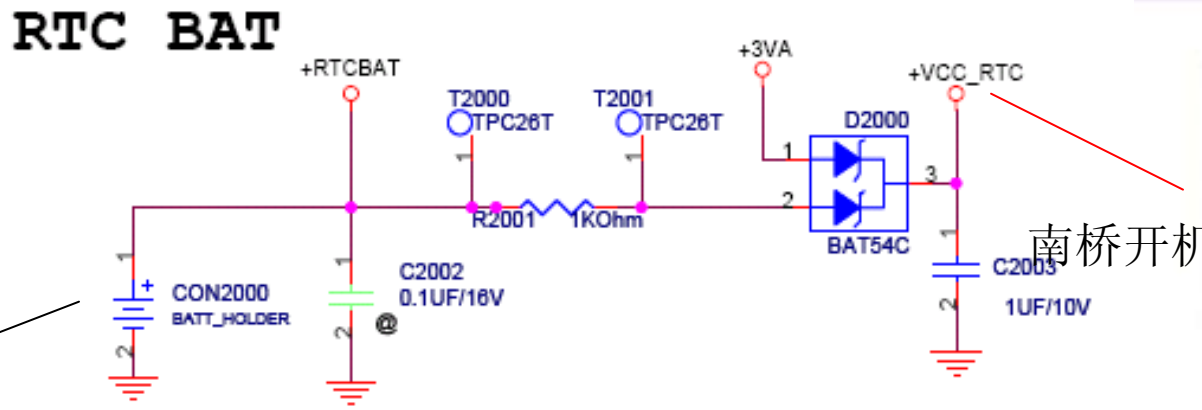
PM_RSMRST

南桥开机条件之一

当EC pin54接收到SUS_PWRGD后从pin105发出PM_RSMRST#

返回南桥

+VCC_RTC



南桥开机条件之一

C-MOS电池

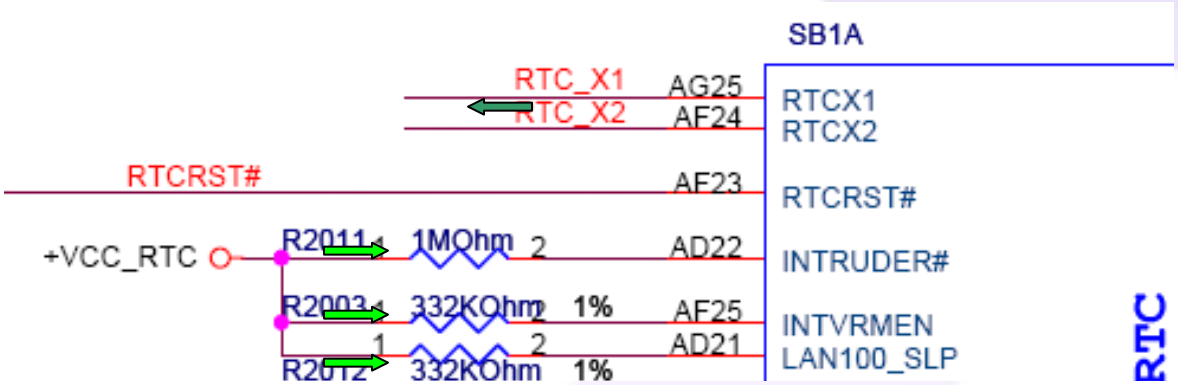
- +RTCBAT经过电阻R2001经过D2000产生+VCC_RTC
- D2000的作用:相当是一个比较器,当有电源工作时则+VCC_RTC由+3VA来提供.没有则由C-MOS电池提供
- 电阻R2001的作用:侦测电流大小,便于计算电池寿命

  电池使用年数=电池总容量/流经电阻R2001的电流/24小时/365天
- +VCC_RTC的作用:①用于南桥CLOCK起振电压(南桥作开机条件)

  ②维持C-MOS信息

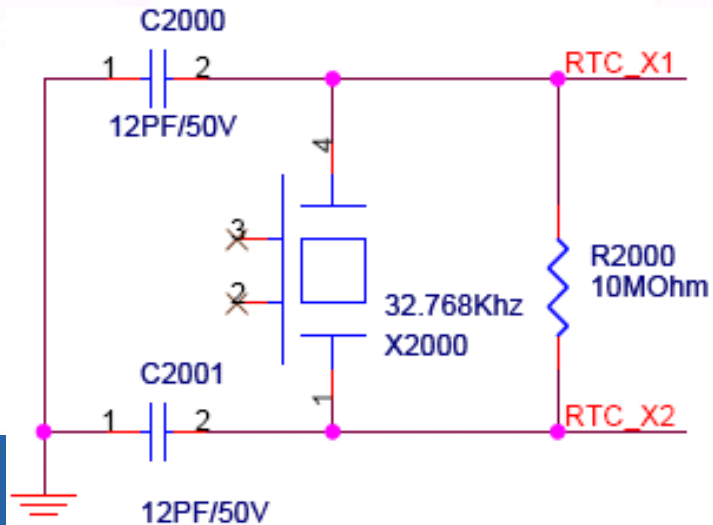
返回南桥

SB-CLOCK



★ +VCC_RTC经过三个电阻输入给南桥,则输出RTC-X1,RTC_X2给晶振X2000产生32.768KHz的频率反馈给南桥

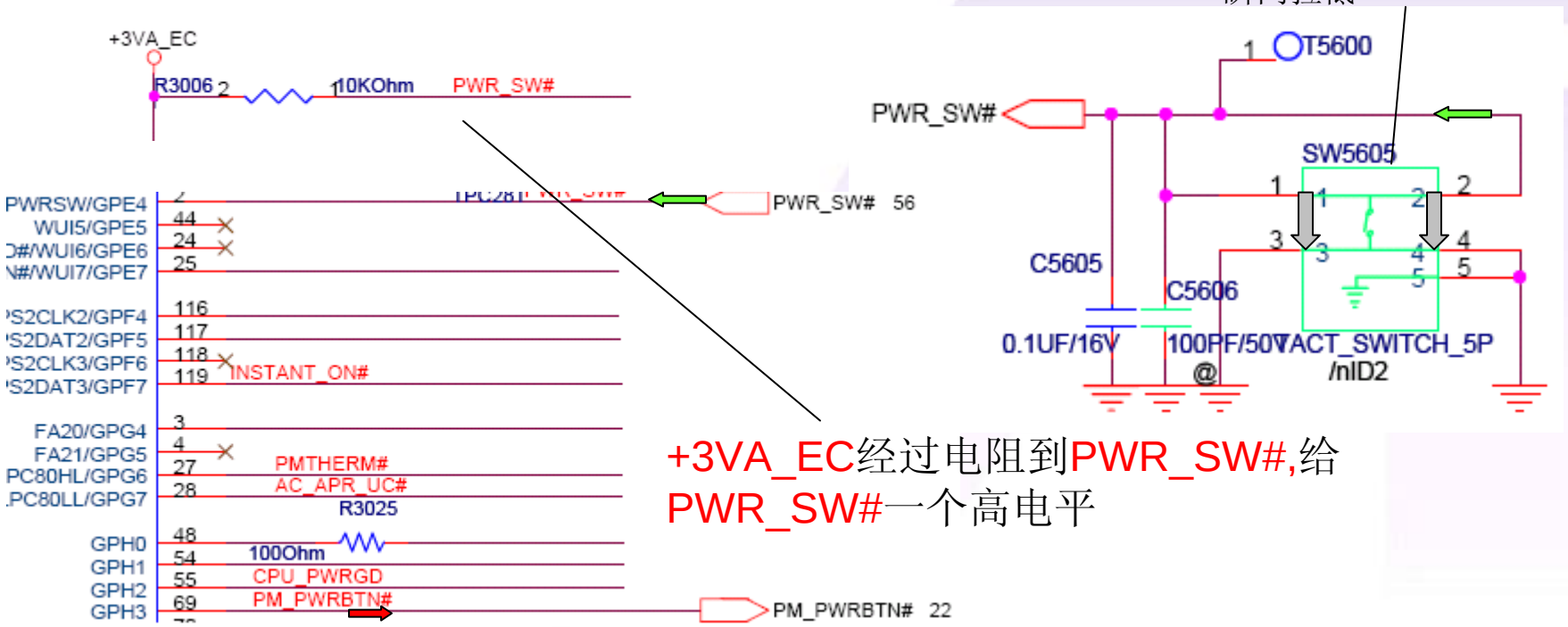
★ RTC_RST:复位C-MOS信息.



返回南桥

PM_PWRBTN#

按下SW5605,则PWR_SW#瞬间拉低



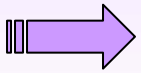
+3VA_EC经过电阻到PWR_SW#,给PWR_SW#一个高电平

南桥开机最后一个条件

返回南桥

南桥开机条件

- +3VSUS
- PM_RSMRST#
- +VCC-RTC
- CLK(32.768KHz)
- PM_PWRBTN#



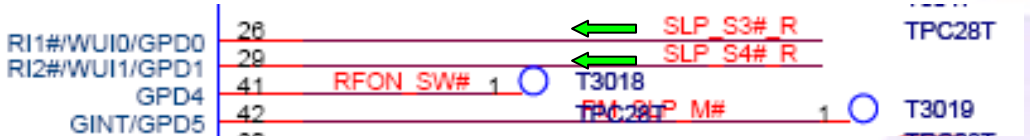
PM_SUSB#

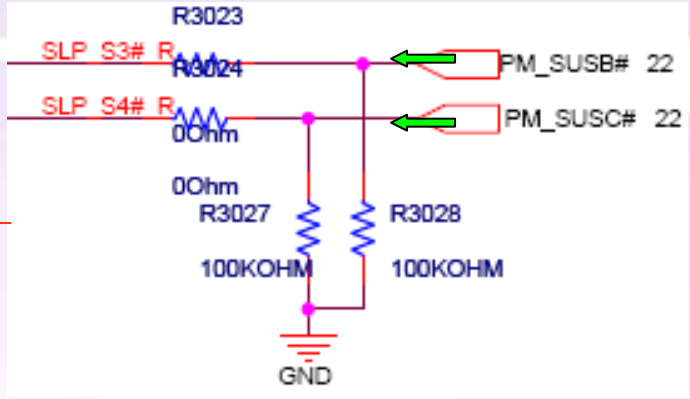
PM_SUSC#

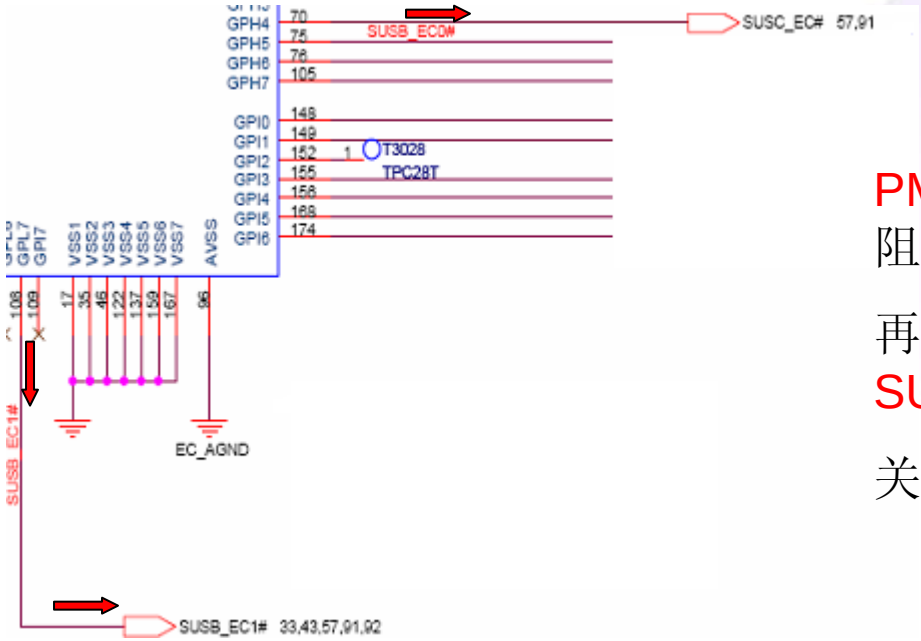
★ 南桥满足上面5个条件后开始工作发出PM_SUSB#,PM_SUSC#

★ PM_SUSC#比PM_SUSB#,先出来

SUSC_EC# SUSB_EC1#





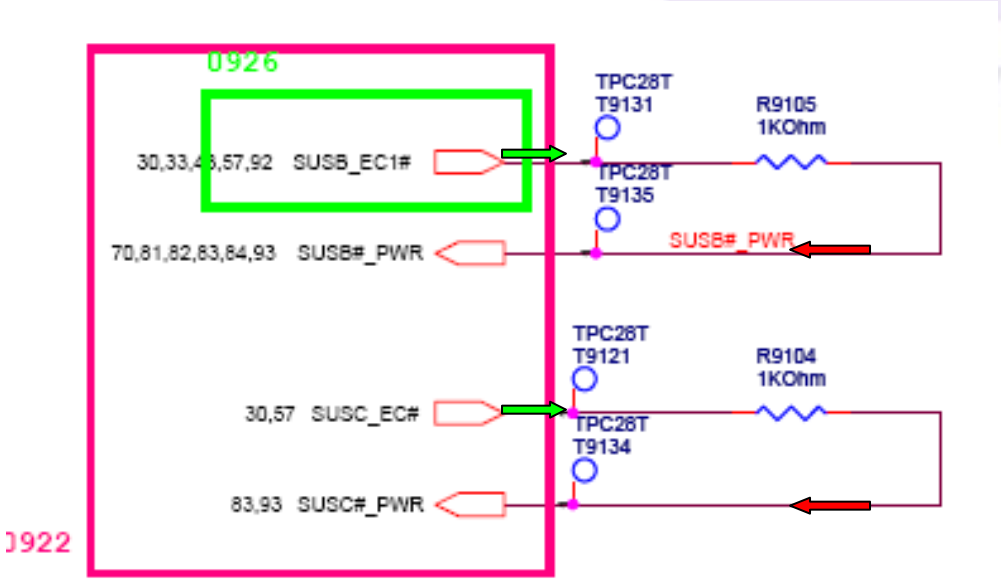


PM_SUSC#,PM_SUSB#分别经过电阻转成SLP_S4_R,SLP_S3_R

再输入EC转成SUSC_EC#和SUSB_EC1#

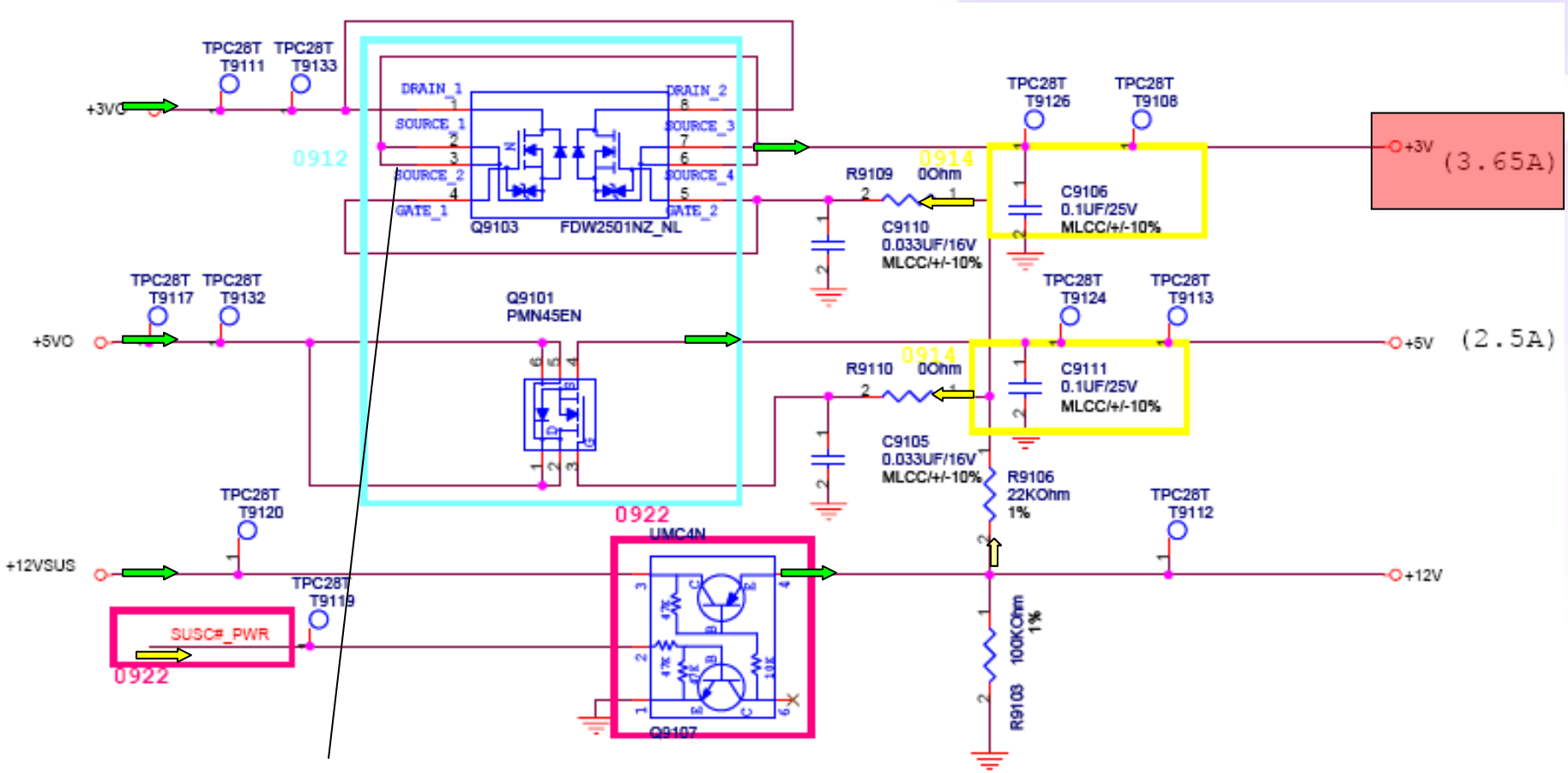
关于S3和S4两种休眠请见附件点击

SUSC#_PWR SUSB#PWR



- SUSB_EC1#经过电阻R9105转换成SUSB#_PWR(开启+?VS)
- SUSC_EC经过电阻R9104转换成SUSC#_PWR (开启+?V)
- 这两个信号主要做后面电压开启和Enable信号

+12V +5V +3V



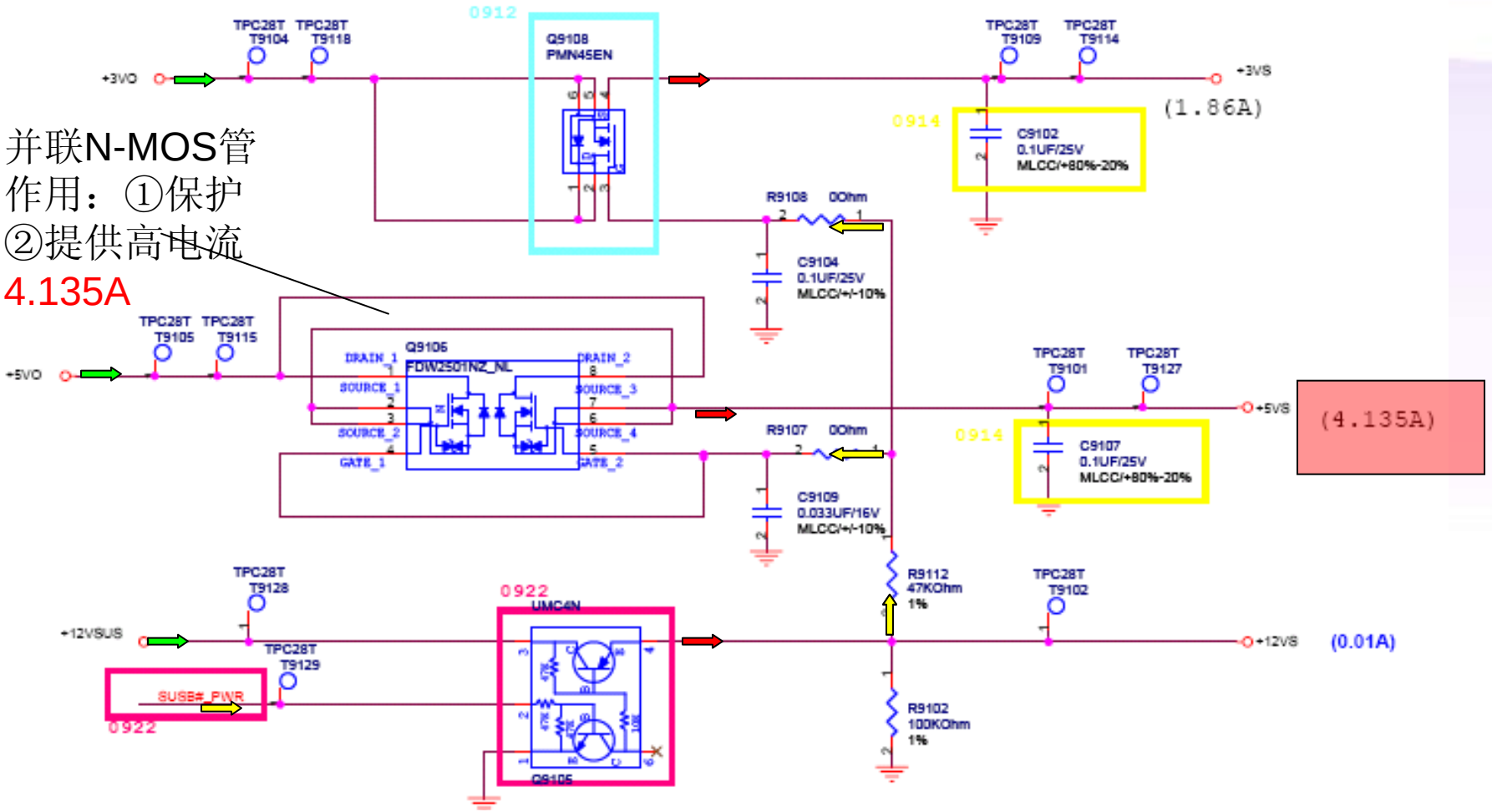
并联N-MOS管作用：

①保护②提供高电流

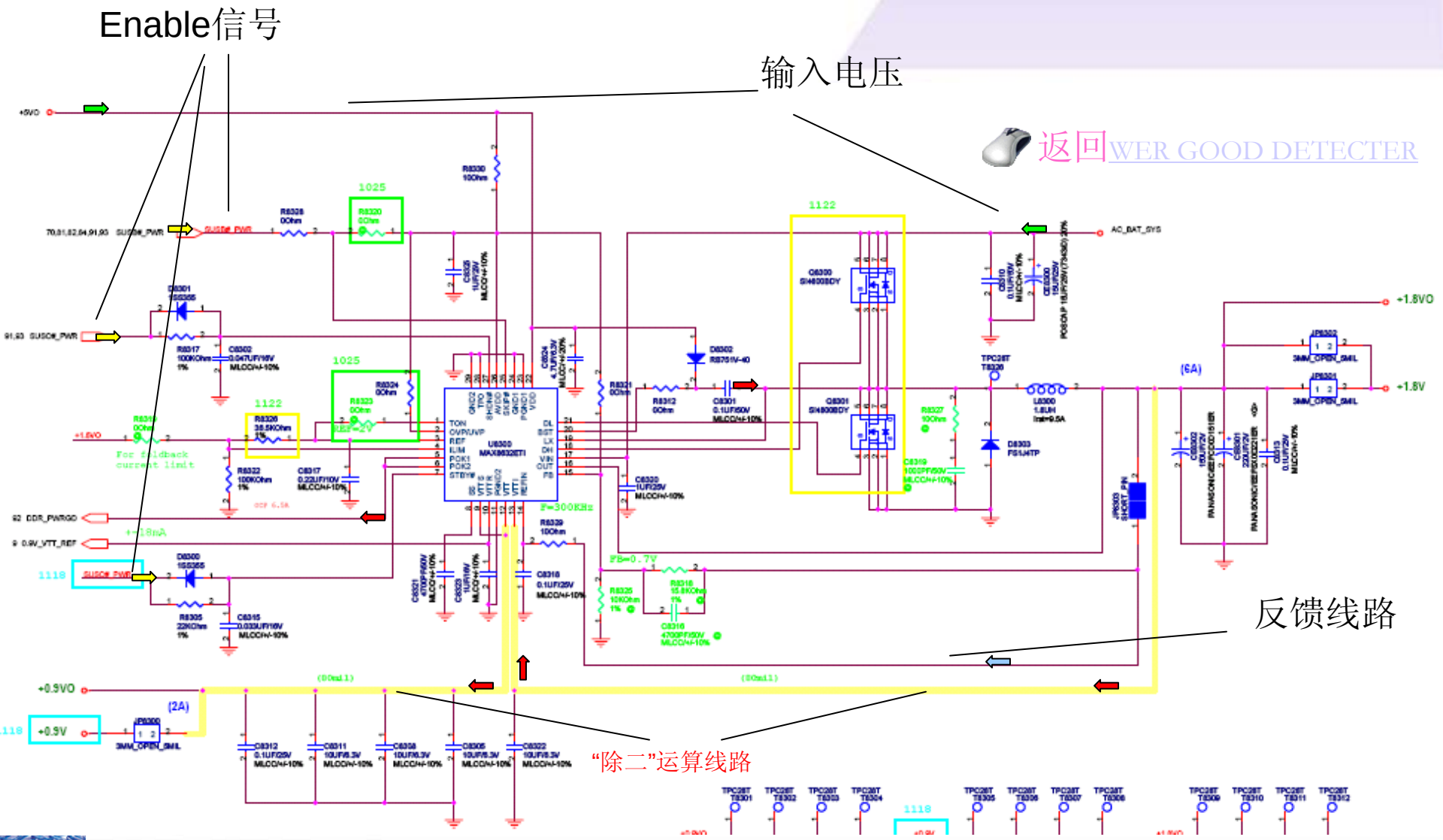
3.65A

+12VS +5VS +3VS

并联N-MOS管
作用：①保护
②提供高电流
4.135A

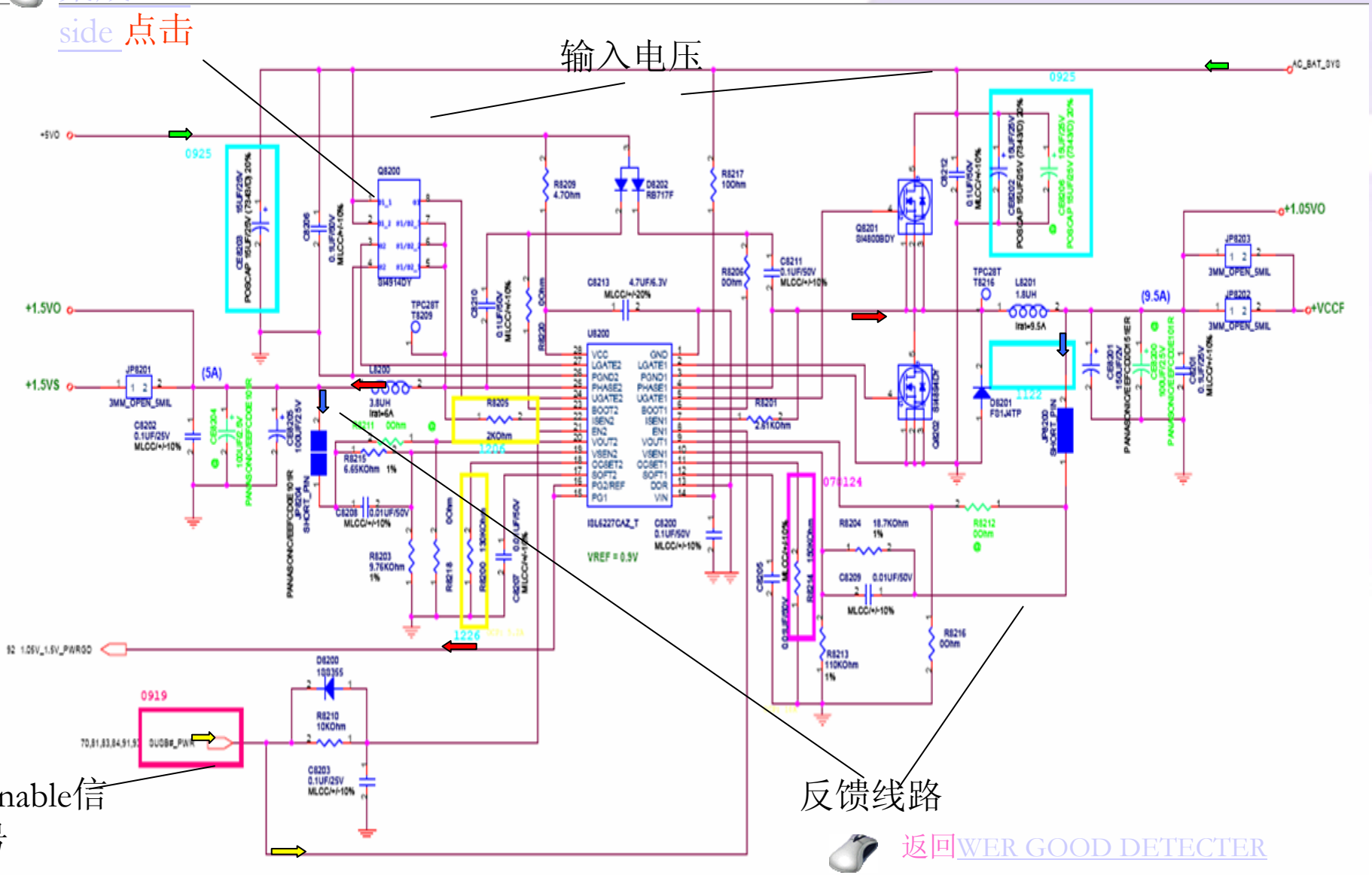


DDR_PWRGD



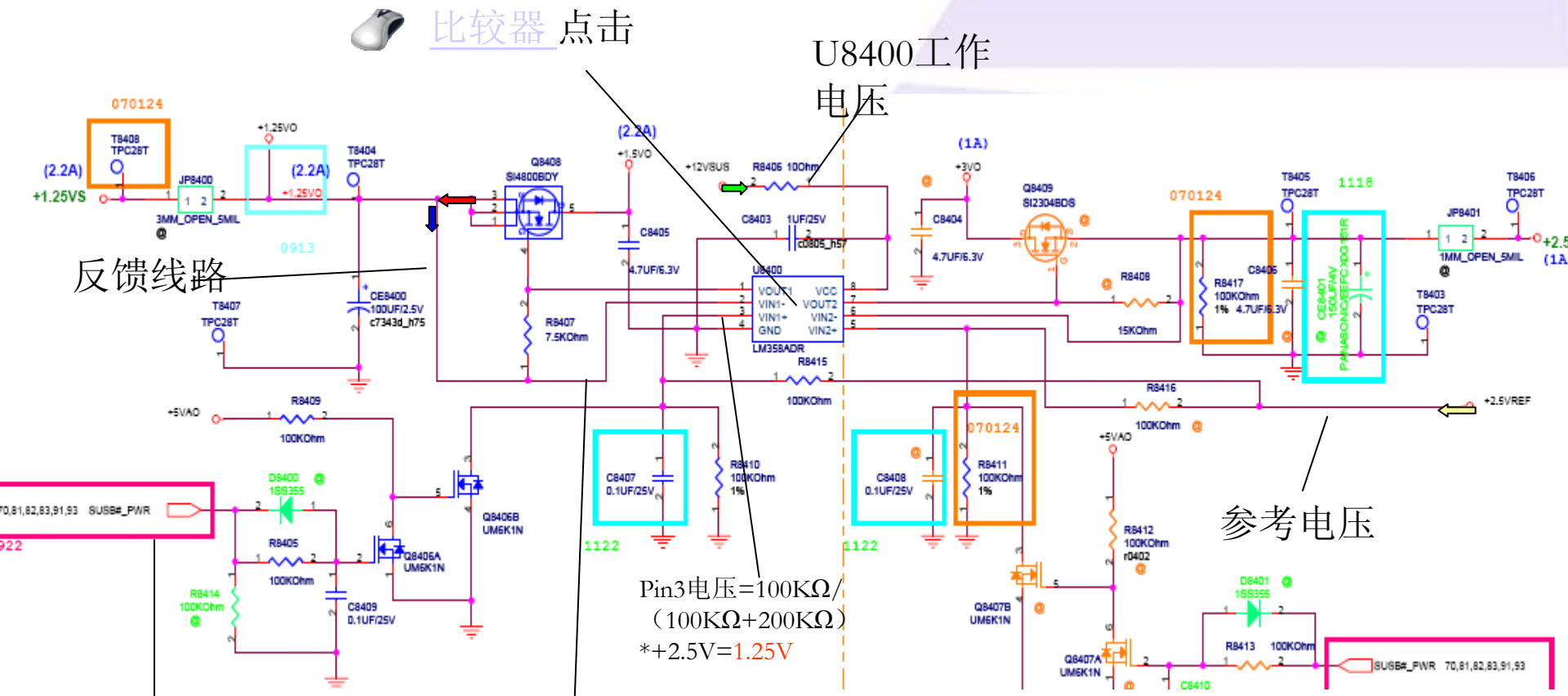
1.05V_1.5V_PWRGD

集成H-L side 点击



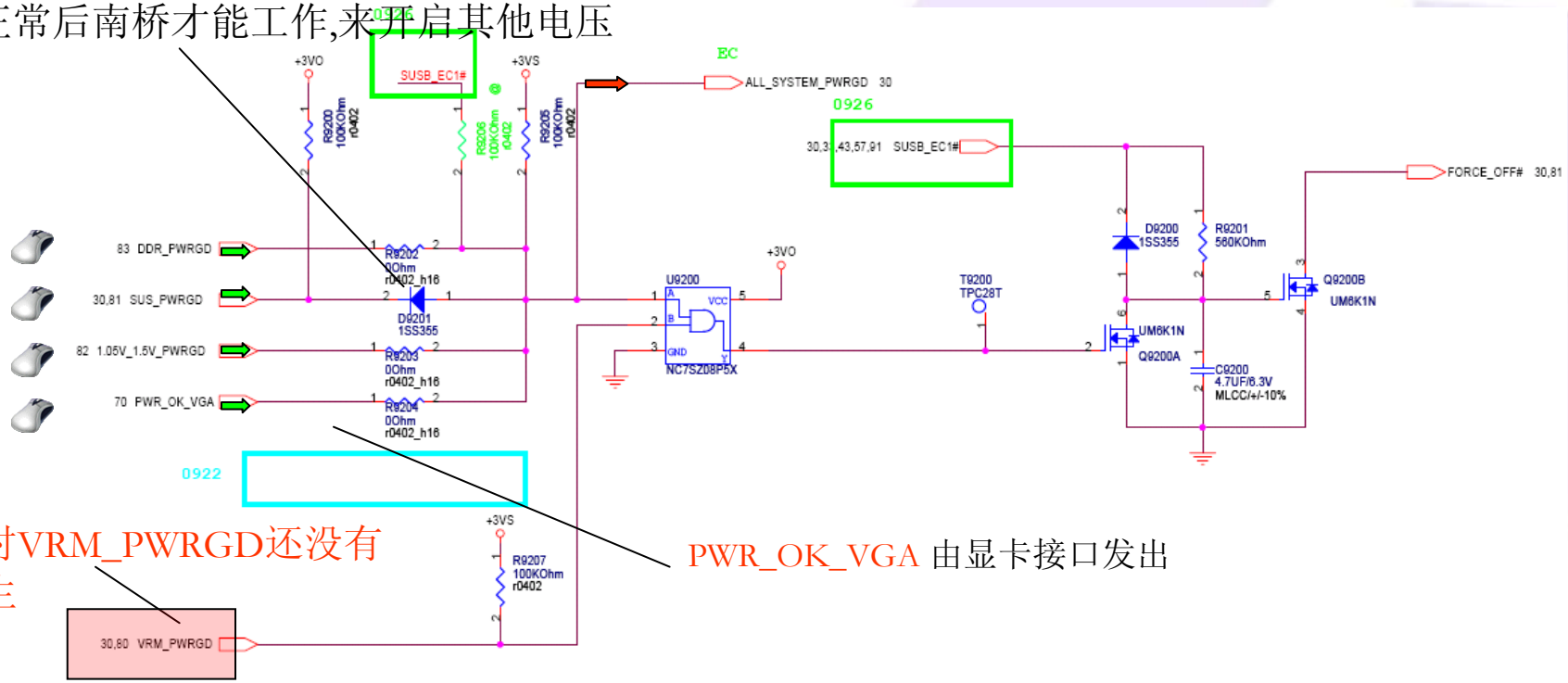
返回WER GOOD DETECTER

+1.25VS


比较器 点击
U8400工作电压
反馈线路
参考电压
Pin3电压=100KΩ/（100KΩ+200KΩ）*+2.5V=1.25V
当pin2反馈电压大于pin3时pin1输出低电平，相反则输出高电平，利用反馈电压来控制N-MOS的开启和关闭
控制信号，休眠时关闭电压
+1.25VS
+1.25VO
+12VSUS
+5VAO
+2.5VREF
SUSB#_PWR
Q8408 SI4800BDY
Q8409 SI2304BDS
U8400 LM358ADR
Q8406A UM6K1N
Q8406B UM6K1N
Q8407A UM6K1N
Q8407B UM6K1N
D8400 1SS355
D8401 1SS355
R8405 100KOhm
R8406 10Ohm
R8407 7.5KOhm
R8408 15KOhm
R8409 100KOhm
R8410 100KOhm 1%
R8411 100KOhm 1%
R8412 100KOhm r0402
R8413 100KOhm
R8414 100KOhm
R8415 100KOhm
R8416 100KOhm
R8417 100KOhm 1% 4.7UF/6.3V
C8403 1UF/25V
C8404 4.7UF/6.3V
C8405 4.7UF/6.3V
C8406
C8407 0.1UF/25V
C8408 0.1UF/25V
C8409 0.1UF/25V
C8410
CE8400 100UF/2.5V c7343d_h75
CE8401 150UF/4V PANASONIC
T8403 TPC28T
T8404 TPC28T
T8405 TPC28T
T8406 TPC28T
T8407 TPC28T
T8408 TPC28T
JP8400 3MM_OPEN_5MIL
JP8401 1MM_OPEN_5MIL
(2.2A)
(1A)
070124
0913
1122
1118

ALL_SYSTEM_PWRGD

二极管在这里的作用:保护SUS_PWRGD,当其他PWRGD有问题时不会拉低SUS_PWRGD,因为只有SUS_PWRGD工作正常后南桥才能工作,来开启其他电压

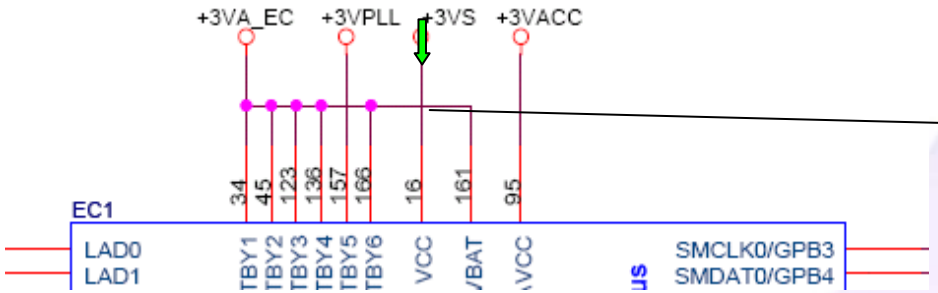


这时VRM_PWRGD还没有产生

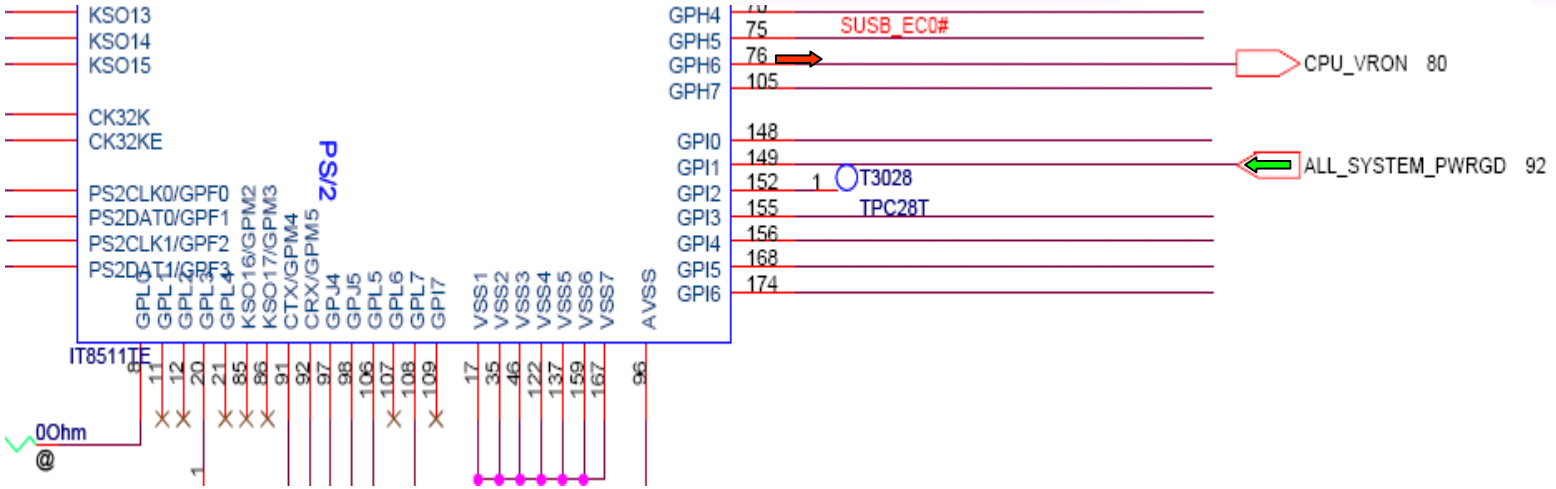
PWR_OK_VGA 由显卡接口发出

这里是个保护电路，上面四个PWRGD为高电平，才会有ALL_SYSTEM_PWR.发送到EC

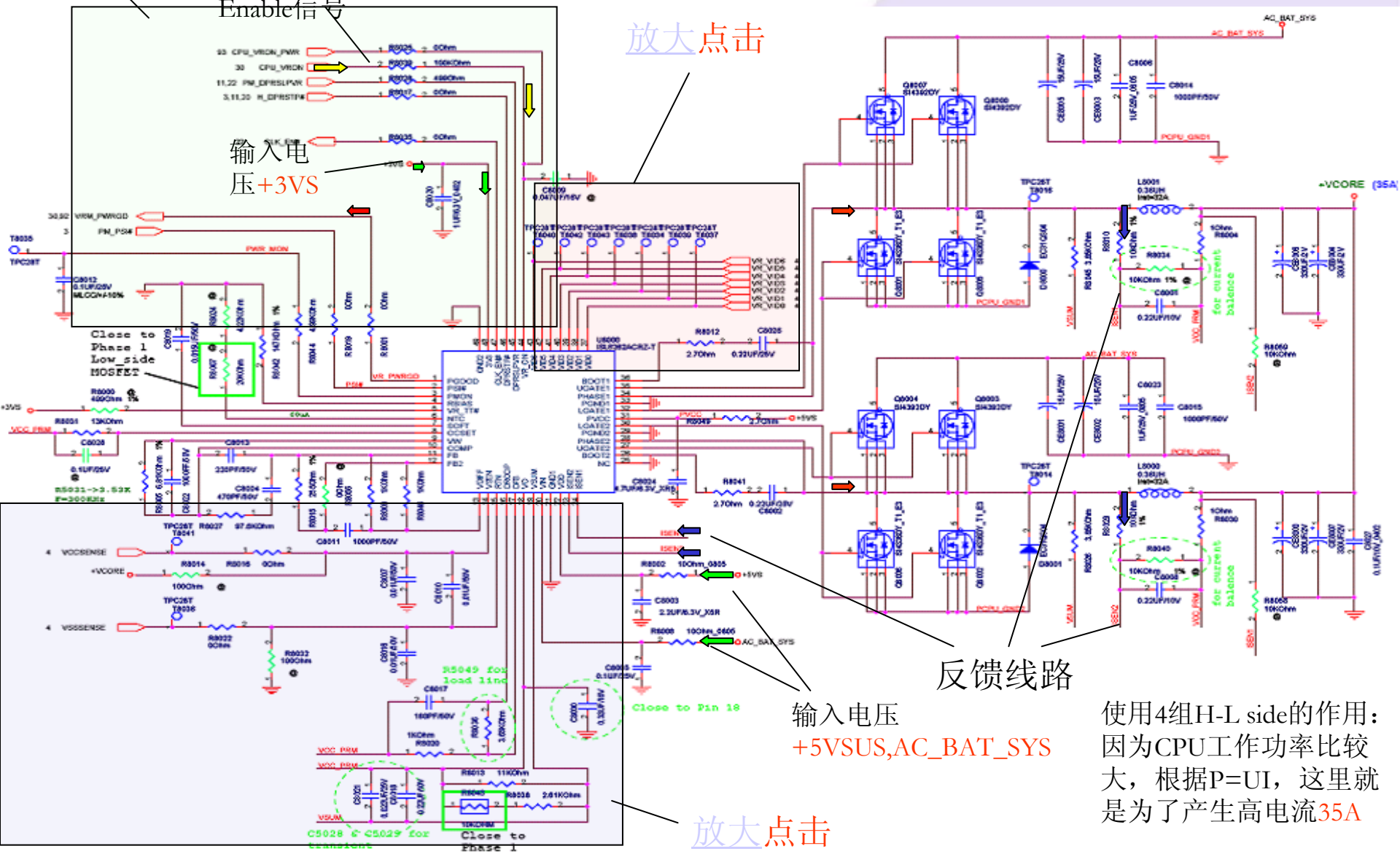
CPU_VRON



输入电压+3VS,其他电压是已经输入了的,+3VS是南桥工作后才产生的.

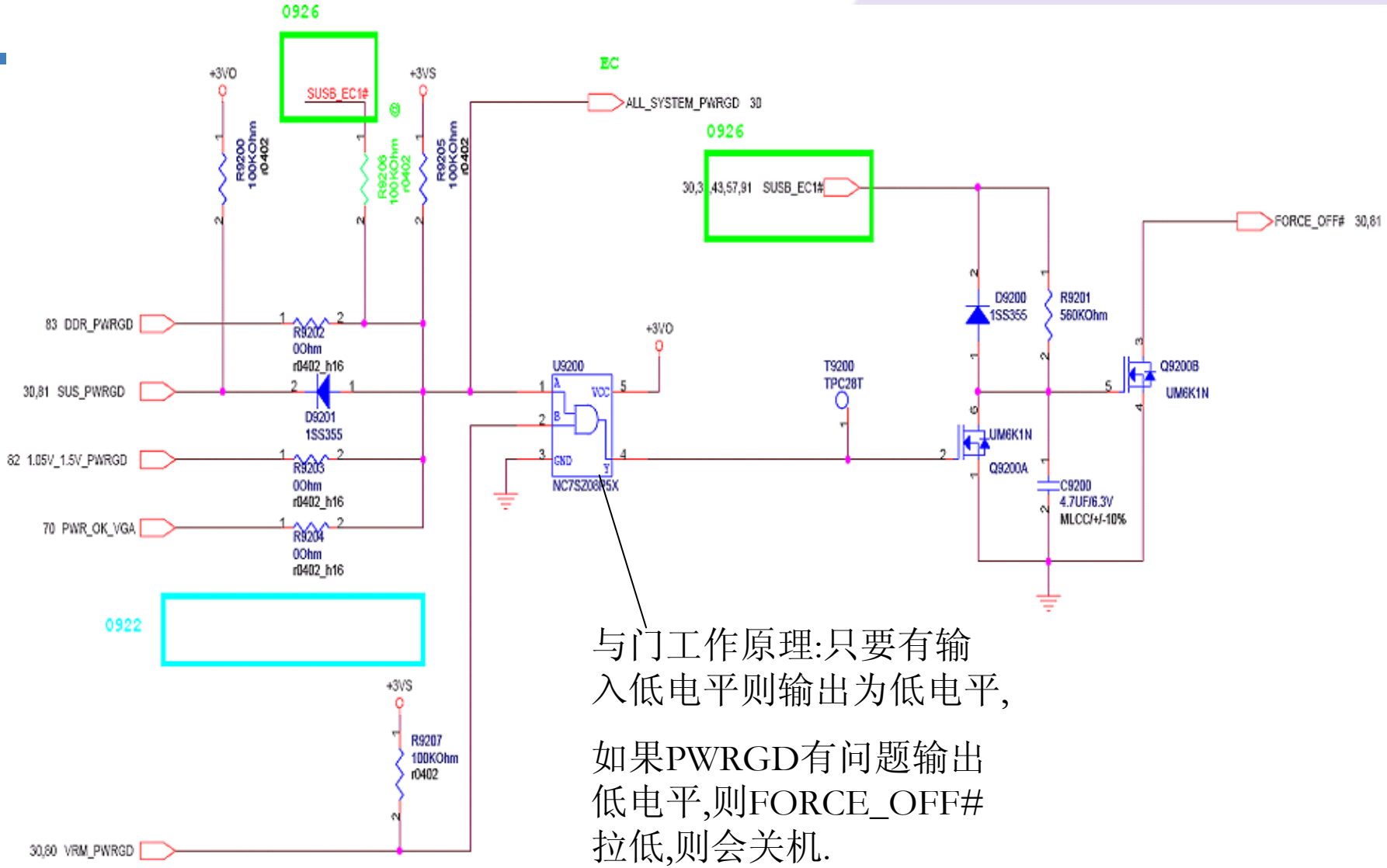


VCORE



使用4组H-L side的作用：因为CPU工作功率比较大，根据P=UI，这里就是为了产生高电流35A

FORCE_OFF#



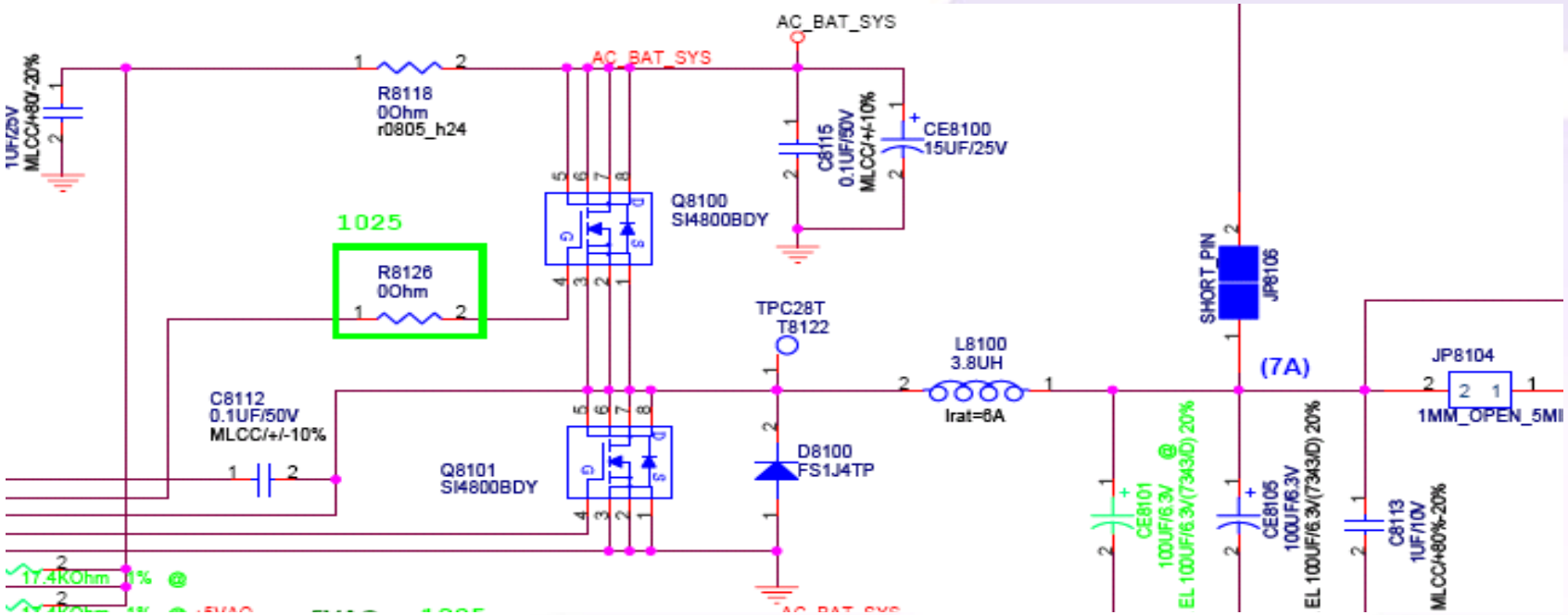
与门工作原理:只要有输入低电平则输出为低电平,

如果PWRGD有问题输出低电平,则FORCE_OFF#拉低,则会关机.

FOREC_OFF点击

END

附:High-Low Side



★ 原理:芯片先给High Side的栅极一个高电平,使其打开电压下来,同时给Low Side的栅极一个低电平使其关闭,产生电压经过电感给电容充电,当电压过高时,则High-Low Side相反工作使电压拉低,维持一个稳定的电压输出.

★ 特点:提高电流,稳定电压

返回

附:休眠方式

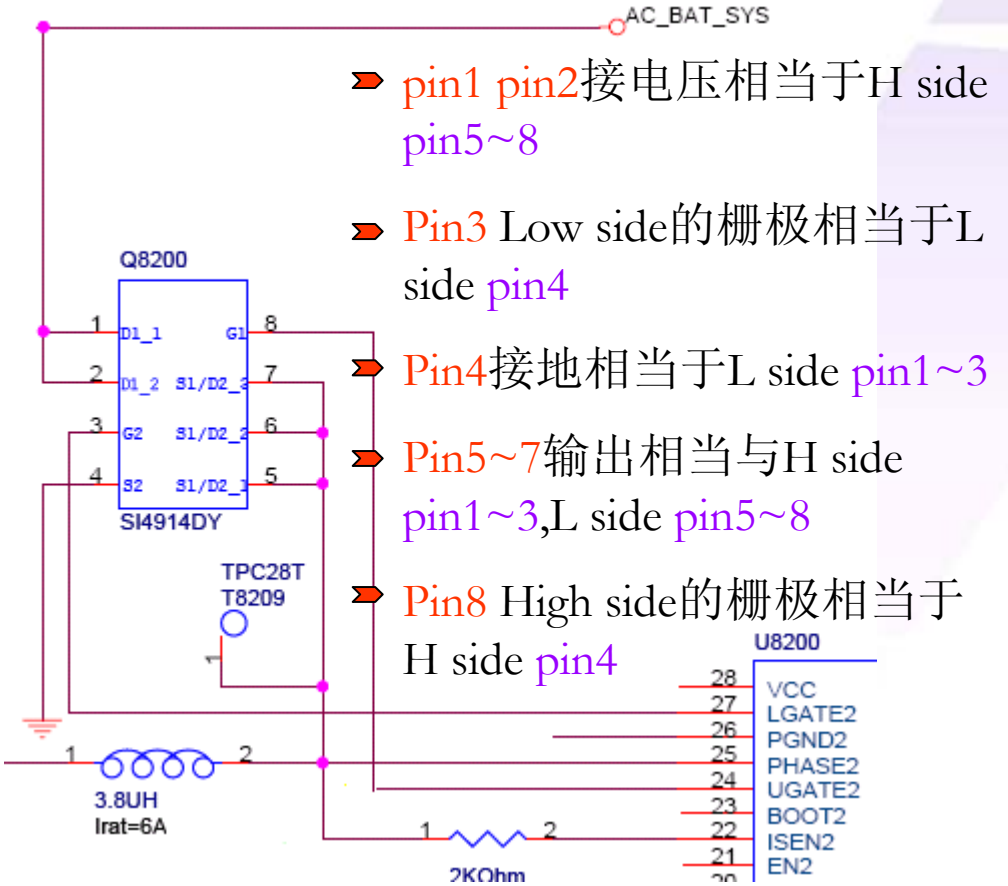
- S3休眠动作流程：利用键盘（FN+F1）→EC，透过LPC_AD[0..3]发送到南桥,南桥将SUSB#拉低,SUSB#所控制的电源全部拉低,(SUSC#控制电源还在)开始进行休眠
- S4休眠动作流程:在WINDOWS状态下按开始菜单,再选择休眠,HDD通过传输信号线到南桥,南桥再把SUSB#和SUSC#拉低,SUSB#,SUSC#控制的电压全部拉低,开始进行休眠
- 休眠后唤醒(不分S3或S4)可分为两种(1)由键盘按任一键经EC发KBCRSM KBCRSM 透过切换线路将PM_PWRBTN# 拉LO 发送到南桥南桥将SUSB# 或SUSB#&SUSC 发高,SUSB# SUSC# 将后续电压开启完成唤醒动作

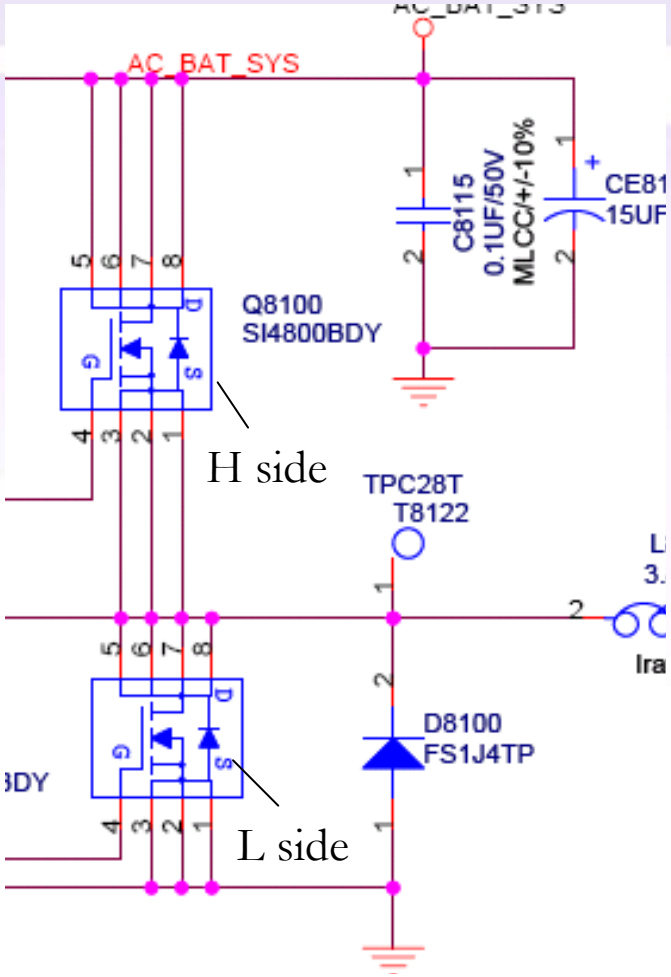
  (2)由PWR_SW#透过切换线路将PM_PWRBTN# 拉LO 发送到南桥,南桥将SUSB# 或SUSB#&SUSC 发高,SUSB# SUSC# 将后续电压开启,完成唤醒动作

返回

附：集成High-Low Side

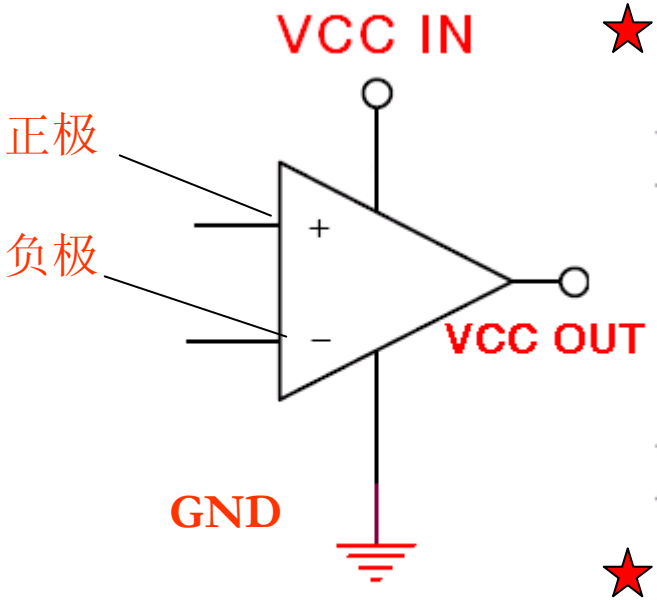
- pin1 pin2接电压相当于H side pin5~8
- Pin3 Low side的栅极相当于L side pin4
- Pin4接地相当于L side pin1~3
- Pin5~7输出相当与H side pin1~3,L side pin5~8
- Pin8 High side的栅极相当于H side pin4





返回

附：比较器



★ 比较器工作原理:

1:当正极大于负极时,输出电压VCC OUT就等于输入电压VCC IN

2当正极小于负极电压时,输出电压VCC OUT就等于接地GND

+ > - VCC OUT=VCC IN

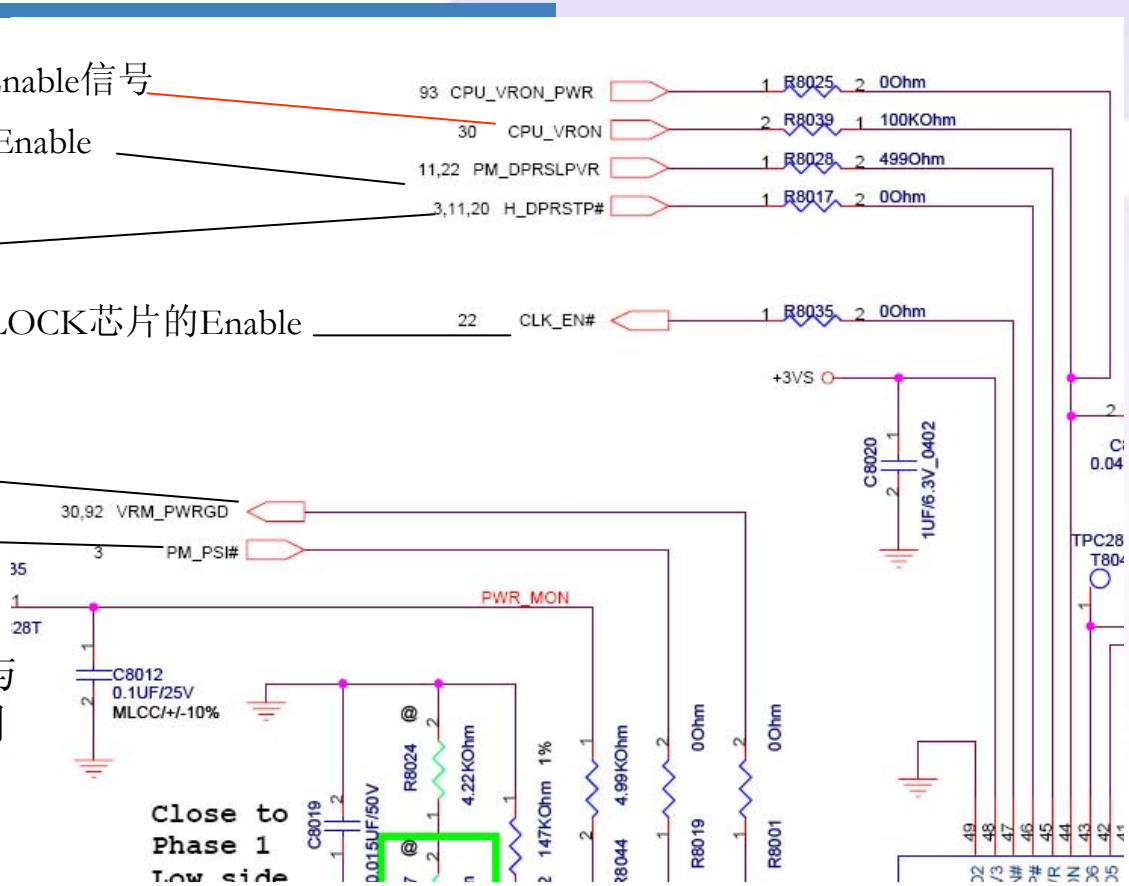
+ < - VCC OUT=GND

★ 比较器一般用于电路中都是固定正极(或负极)电压电压,利用VCC OUT来控制负极(或正极)电压

返回

附： VCORE IC-放大1

- CPU_VRON=1 :EC发出给VCORE IC的Enable信号
- PM_DPRSLPVR=1:CPU深度休眠模式的Enable信号
- H_DPRSTP#=0:CPU正在深度休眠模式
- 给CLOCK芯片的Enable
- VRM_PWRGD=1:VCORE POWER OK.
- PM_PSI#=0:CPU降频时通知VCORE调低电压

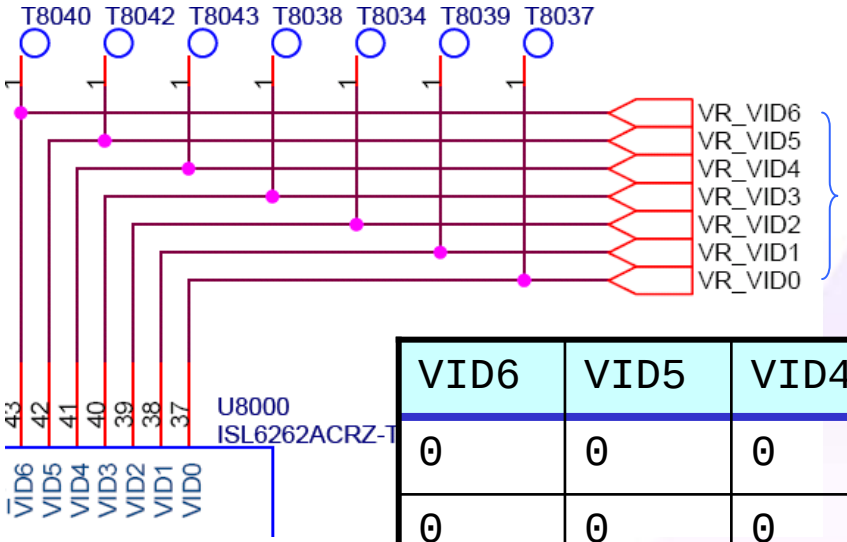


★PM_DPRSLPVR,H_DPRSTP#,CPU与南桥进入降频模式时通知VCORE调低电压分别进入S3和S4模式.

★CLK_EN#在此板上没用上,而是使用EC发出.

返回

附： VCORE IC-放大2

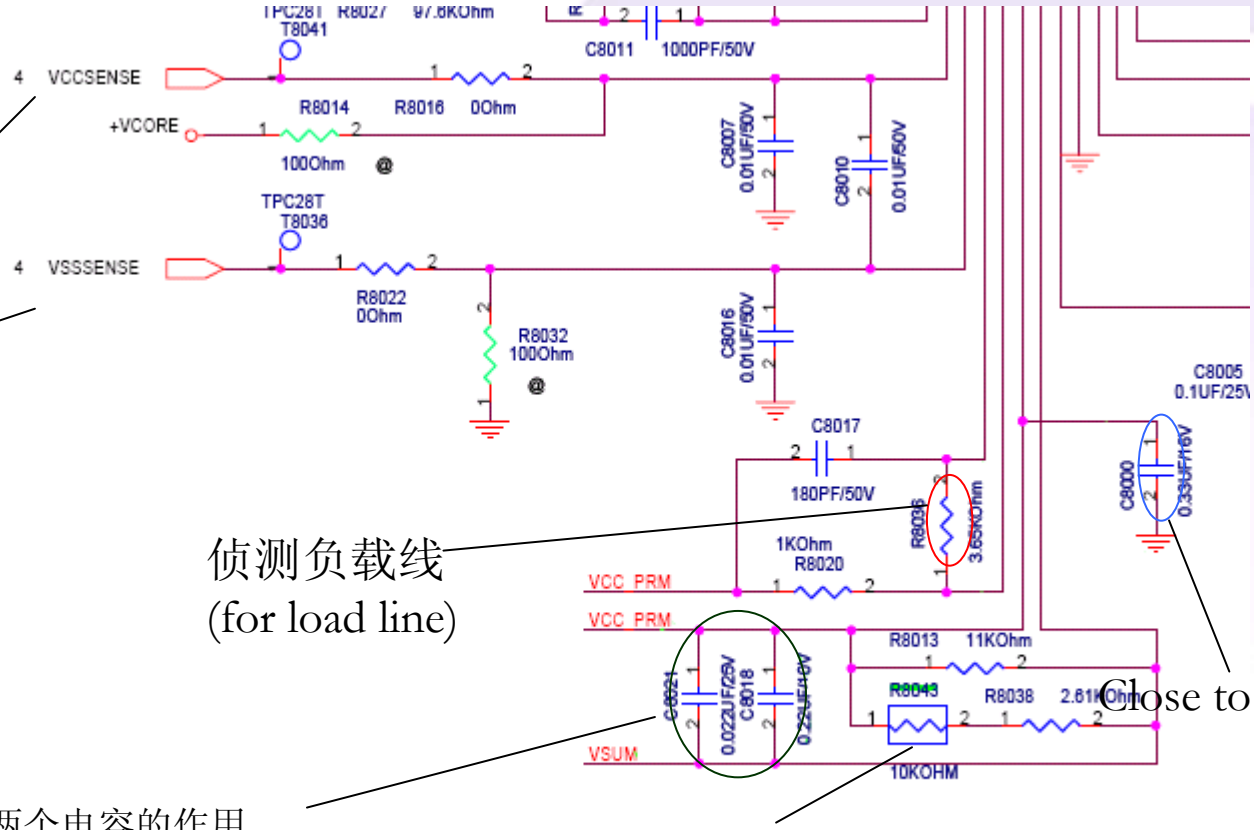


CPU通过这7组数据线
改变VCORE电压大小

VID6	VID5	VID4	VID3	VID2	VID1	VID0	Vout
0	0	0	0	0	0	0	1.500
0	0	0	0	0	0	0	1.487
0	0	0	0	1	0	1	1.437
0	0	1	1	1	0	0	1.150
0	1	1	0	1	0	1	0.837
0	1	1	1	0	1	1	0.762
1	1	0	0	0	0	0	0.300
1	1	1	1	1	1	1	0.000

返回

附： VCORE IC-放大3



CPU侦测VCORE
输出电压大小

侦测负载线
(for load line)

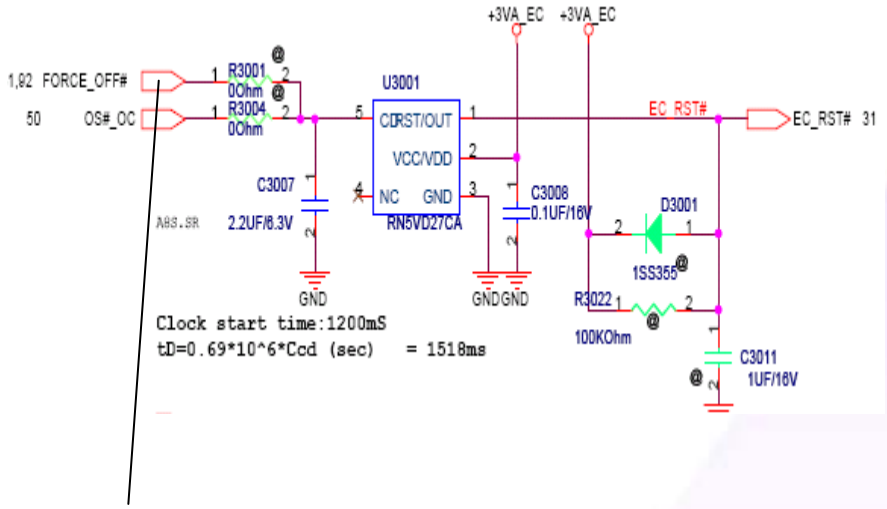
Close to pin18

这两个电容的作用
瞬态响应(for transient response)

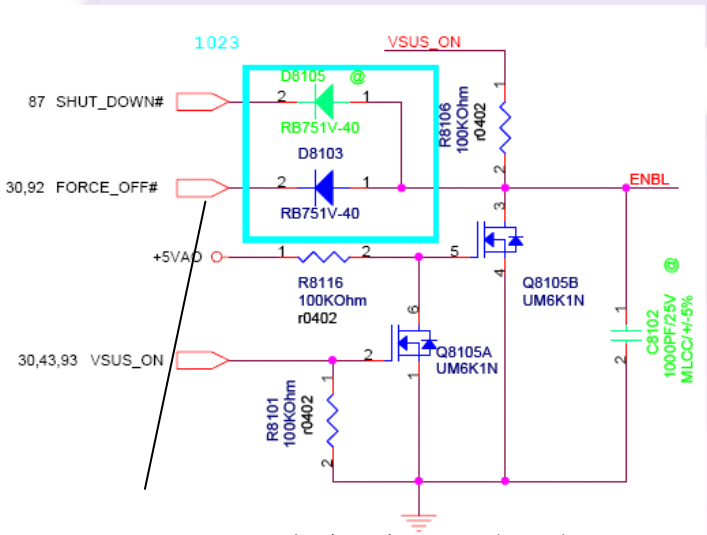
接近阶段1的感应器
(Close to Phase 1 Inductor)

返回

附：FORCE_OFF#关机原理



FORCE_OFF#为低电平时,控制U3001工作,而无法发出EC_RST#,使得EC不工作,而导致关机,但在此处电阻R3001没上,而是利用右图控制关机.

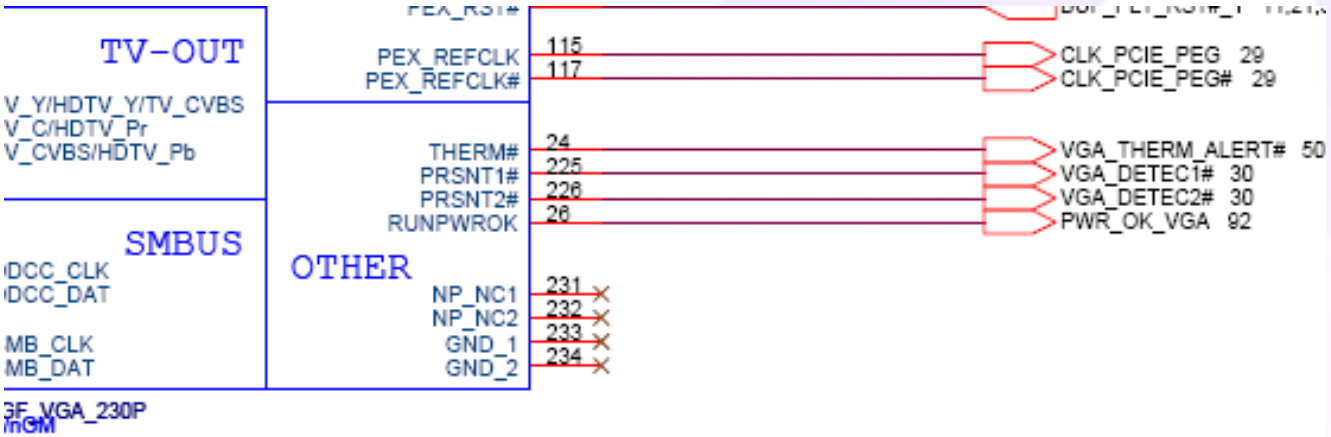


FORCE_OFF#为低电平时,则ENBL信号经过D8103而导通拉低,使得ENBL无法开启+3VSUS,+5VSUS,+12VSUS,而导致关机

电阻R8106作用:ENBL拉低后,保护EC损坏

返回

附：PWR_OK_VGA



返回WER GOOD DETECTER