瑞萨电子CPKHMI-RA8D1B 核心板原理图 V1.0

MCU电源

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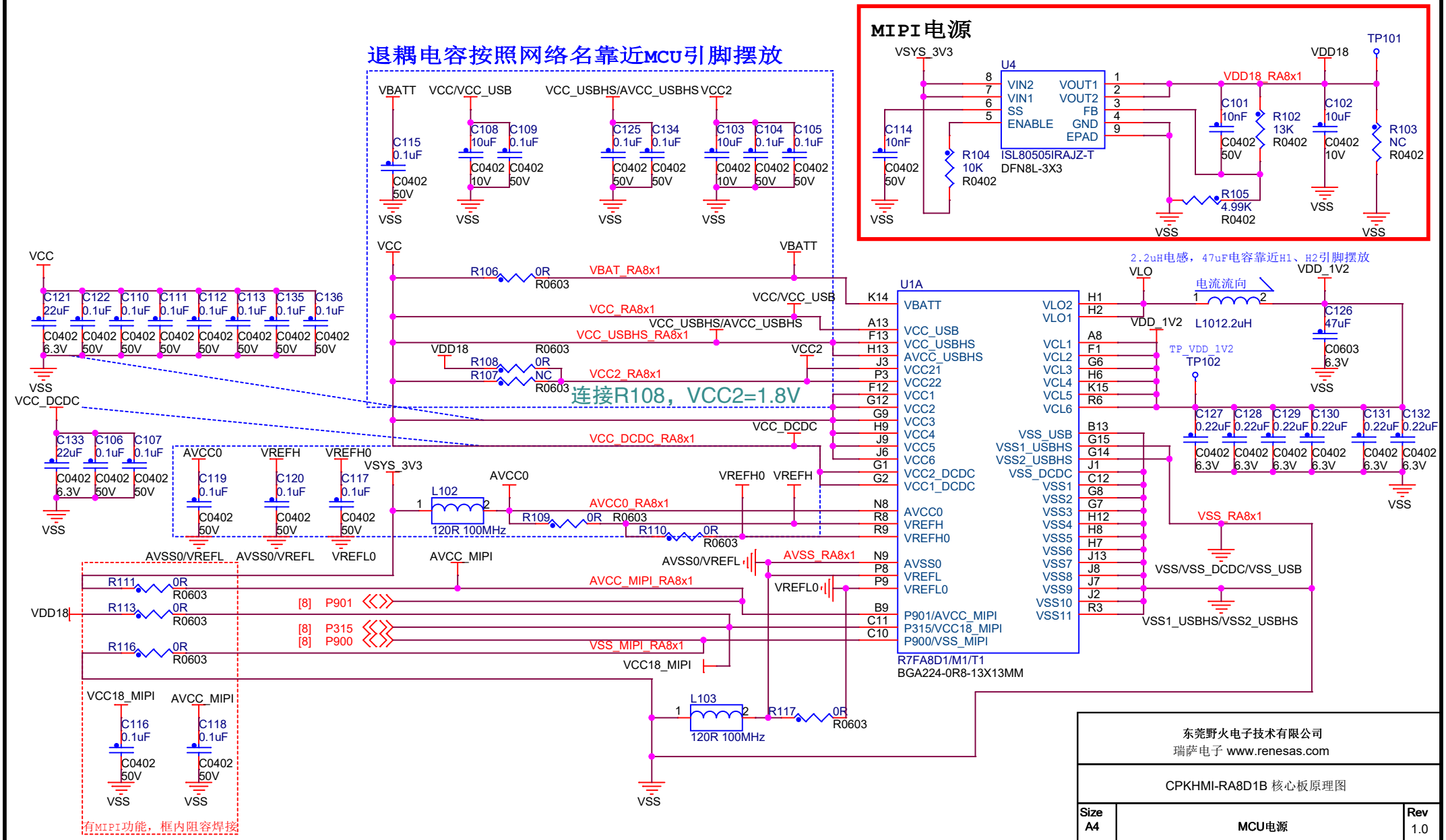
Page4: USB HS
Page5: SDRAM
Page6: STORAGE MEMORY
Page7: 电源LDO/DCDC
Page8: BTB
Page9: PIN HEADERS
Page10: 以太网



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CPKHMI-RA8D1B 核心板原理图	
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MCU I/O

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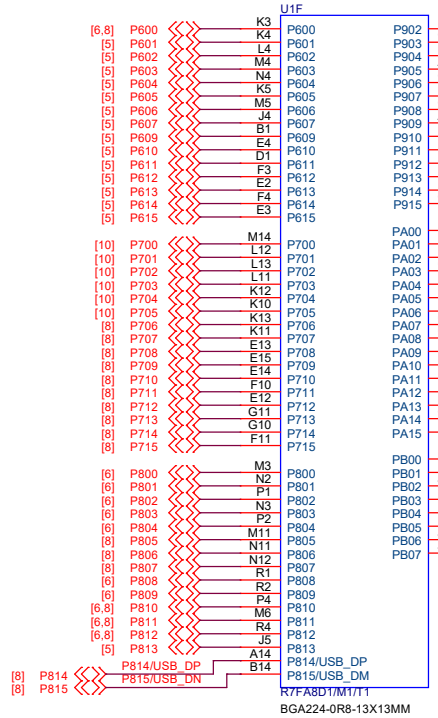
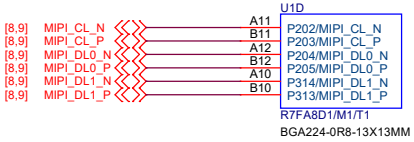
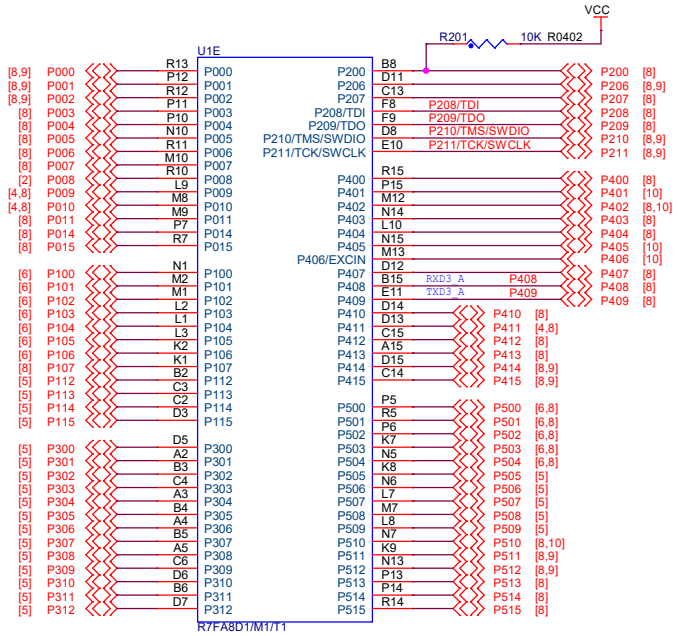
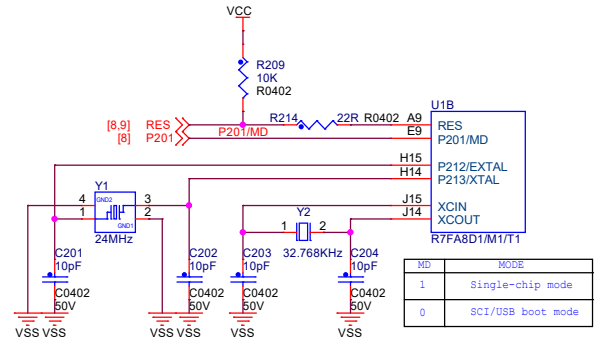


时钟差分线P808、P809阻抗匹配100R，layout走线差分线！！
USB差分线P814、P815阻抗匹配90R，layout走线差分线！！



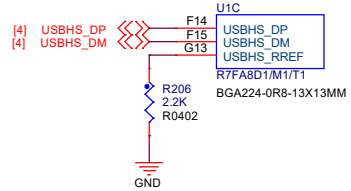
P202、P203阻抗匹配100R，layout走线差分线！！
P204、P205阻抗匹配100R，layout走线差分线！！
P313、P314阻抗匹配100R，layout走线差分线！！



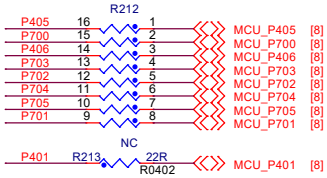


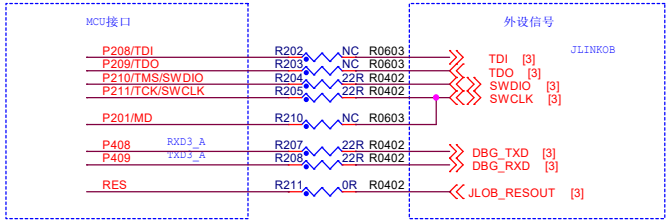
MD	MODE
1	Single-chip mode
0	SCI/USB boot mode

如果使用USB HS，主晶振只能选12/20/24/48MHz



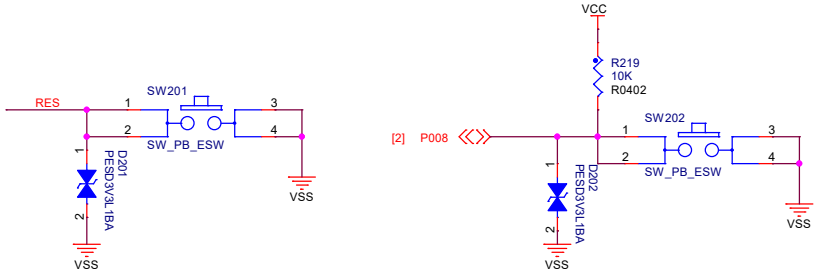
以太网管脚和CEU管脚复用
缺省使用以太网功能：R212不实装
如需在扩展板上使用CEU功能，则需要断开R1007和R1021，并安装R212。





SYS LED

按键



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Jlink OB

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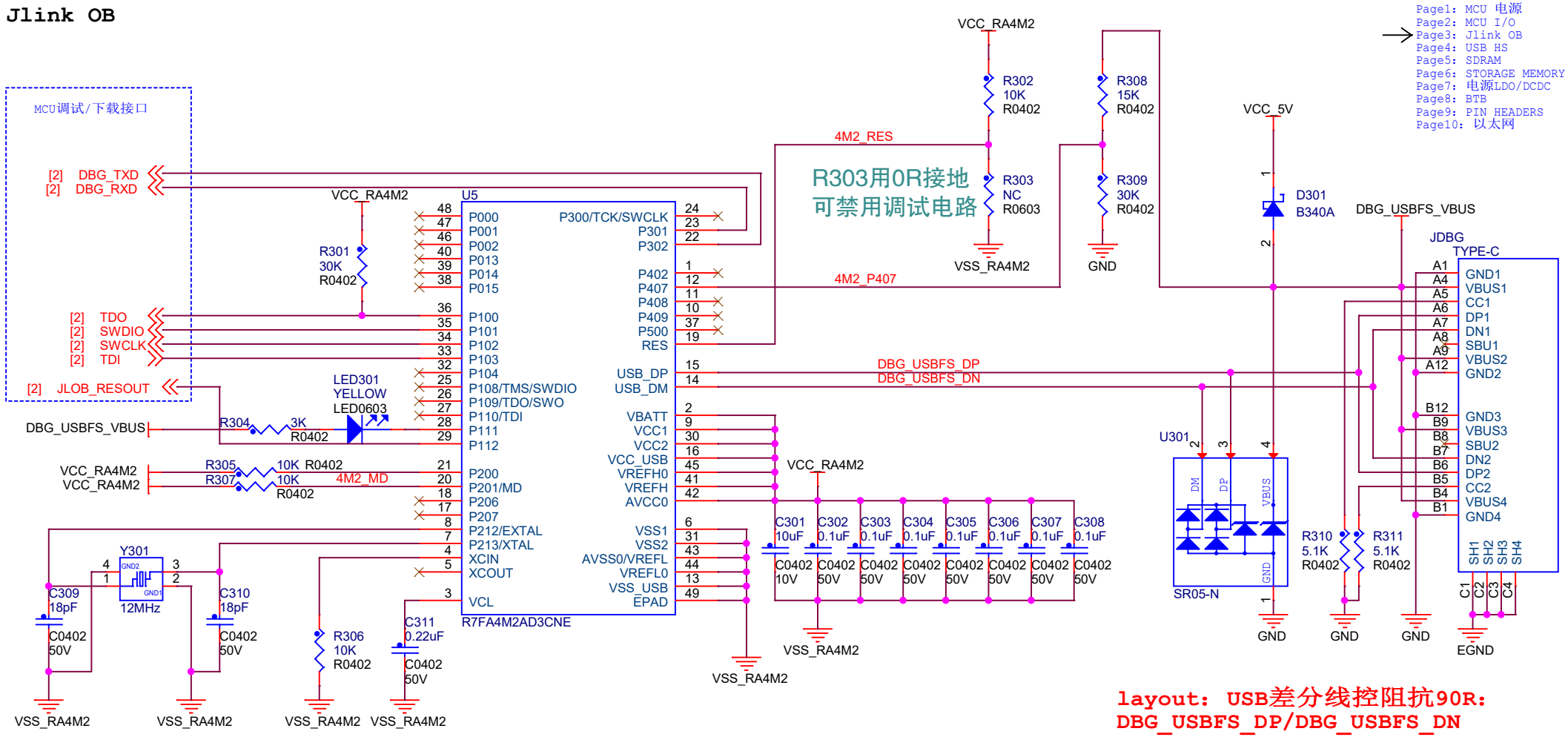

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USB HS

如果使用USB HS，主晶振只能选12/20/24/48MHz

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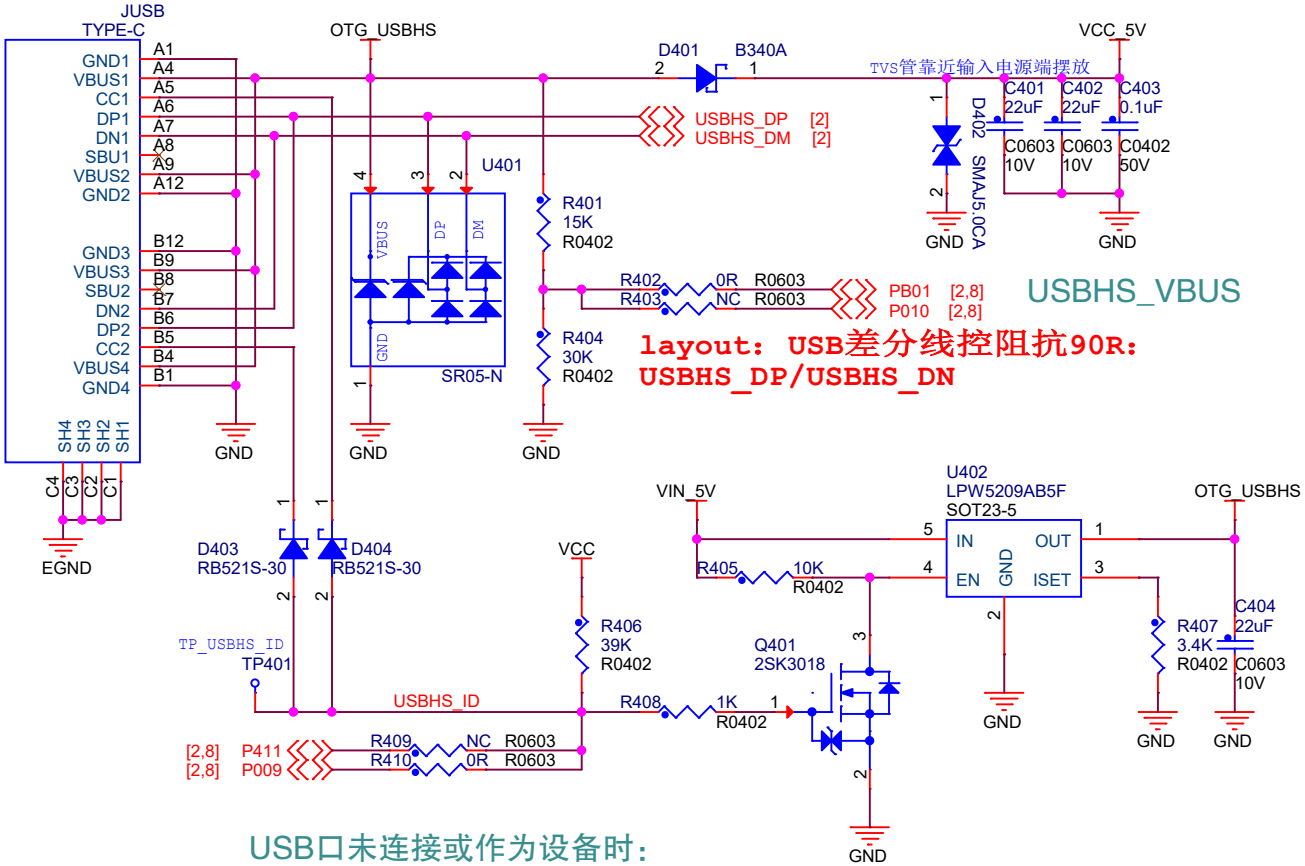

USB口未连接或作为设备时：
USBHS_ID为高电平，U402不工作

USB口作为主机有TypeC设备连接时：
USBHS_ID为低电平，U402工作，为USB口供电

通过USBHS_ID和USBHS_VBUS的状态
来判断USB口的状态

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SDRAM

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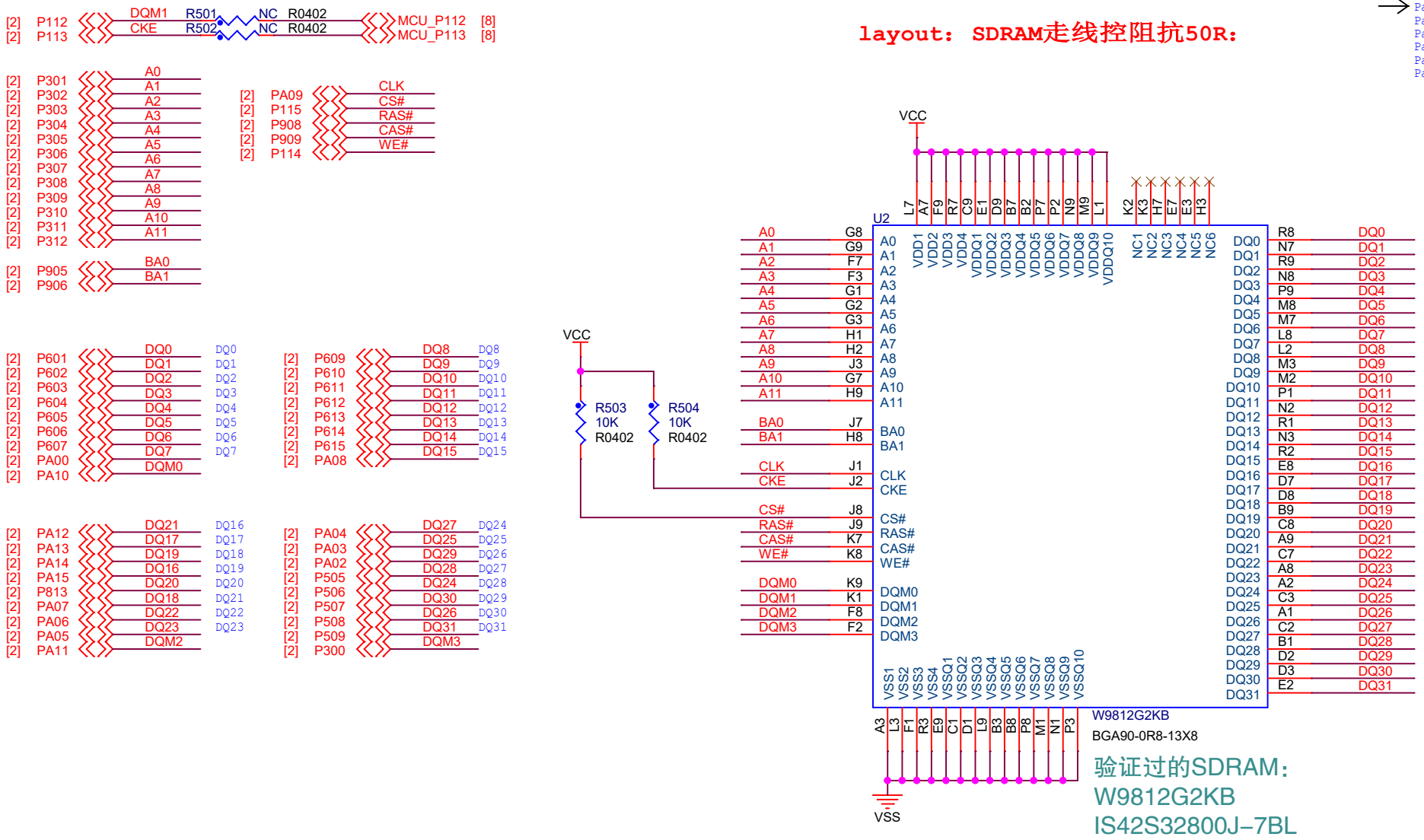
layout: SDRAM走线控阻抗50R:



验证过的SDRAM:
W9812G2KB
IS42S32800J-7BL

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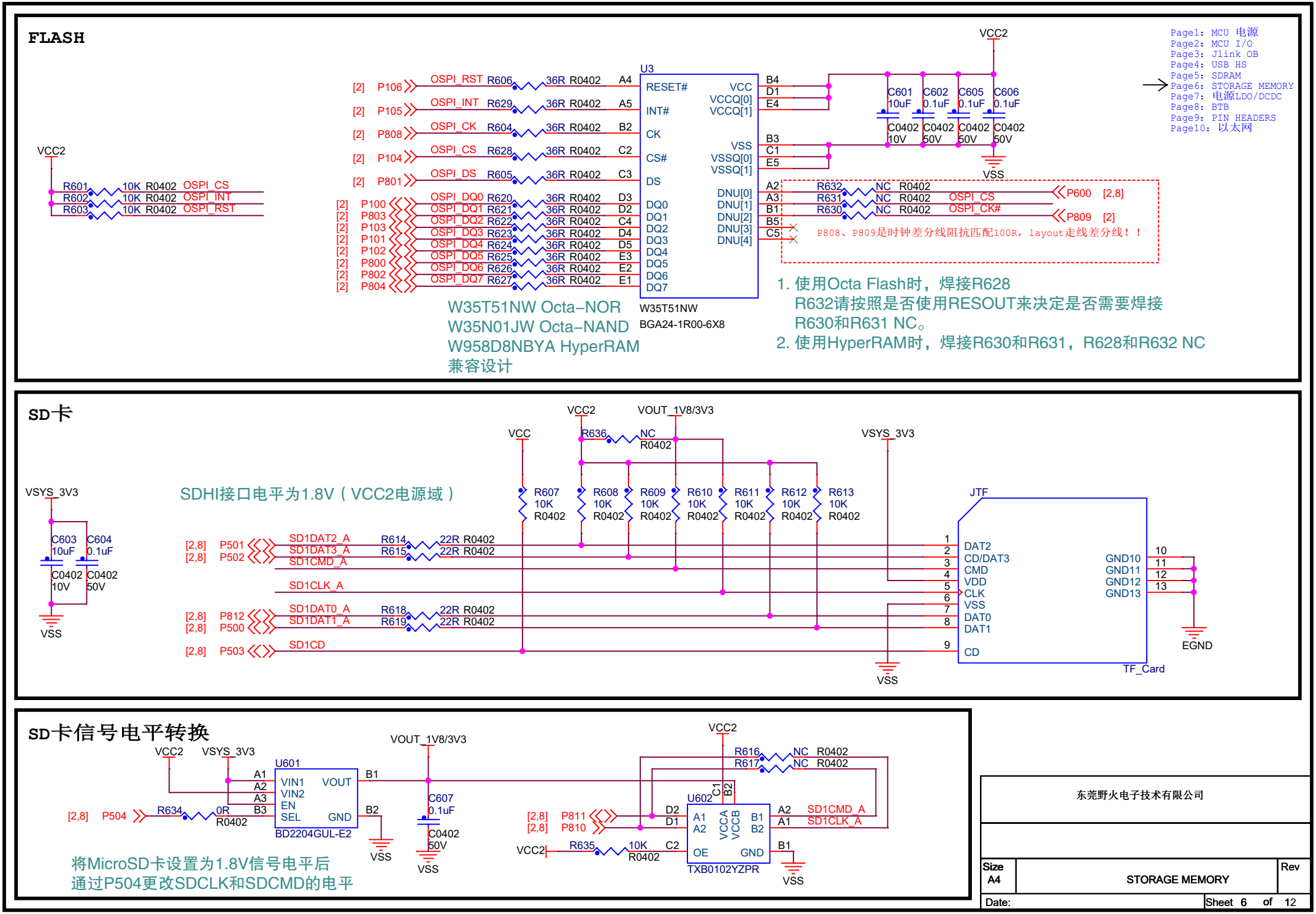
FLASH
U3
RESET#
INT#
CK
CS#
DS
DQ0
DQ1
DQ2
DQ3
DQ4
DQ5
DQ6
DQ7
VCC
VCCQ[0]
VCCQ[1]
VSS
VSSQ[0]
VSSQ[1]
DNU[0]
DNU[1]
DNU[2]
DNU[3]
DNU[4]
W35T51NW
BGA24-1R00-6X8
OSPI_RST
OSPI_INT
OSPI_CK
OSPI_CS
OSPI_DS
OSPI_DQ0
OSPI_DQ1
OSPI_DQ2
OSPI_DQ3
OSPI_DQ4
OSPI_DQ5
OSPI_DQ6
OSPI_DQ7
P106
P105
P808
P104
P801
P100
P803
P103
P101
P102
P800
P802
P804
R601 10K R0402 OSPI_CS
R602 10K R0402 OSPI_INT
R603 10K R0402 OSPI_RST
VCC2
C601 10uF
C602 0.1uF
C605 0.1uF
C606 0.1uF
C0402 10V
C0402 50V
R632 NC R0402
R631 NC R0402 OSPI_CS
R630 NC R0402 OSPI_CK#
P600 [2,8]
P809 [2]
P808、P809是时钟差分线阻抗匹配100R，layout走线差分线！！
W35T51NW Octa-NOR
W35N01JW Octa-NAND
W958D8NBYA HyperRAM
兼容设计
1. 使用Octa Flash时，焊接R628
R632请按照是否使用RESOUT来决定是否需要焊接
R630和R631 NC。
2. 使用HyperRAM时，焊接R630和R631，R628和R632 NC
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SD卡
VSYS_3V3
VOUT_1V8/3V3
R636 NC R0402
R607 10K R0402
R608 10K R0402
R609 10K R0402
R610 10K R0402
R611 10K R0402
R612 10K R0402
R613 10K R0402
C603 10uF
C604 0.1uF
C0402 10V
C0402 50V
SDHI接口电平为1.8V（VCC2电源域）
P501
P502
P812
P500
P503
SD1DAT2_A
SD1DAT3_A
SD1CMD_A
SD1CLK_A
SD1DAT0_A
SD1DAT1_A
SD1CD
R614 22R R0402
R615 22R R0402
R618 22R R0402
R619 22R R0402
JTF
DAT2
CD/DAT3
CMD
VDD
CLK
VSS
DAT0
DAT1
CD
GND10
GND11
GND12
GND13
EGND
TF_Card
SD卡信号电平转换
U601
VIN1
VIN2
EN
SEL
VOUT
GND
BD2204GUL-E2
P504
R634 0R R0402
C607 0.1uF
C0402 50V
R616 NC R0402
R617 NC R0402
U602
A1
A2
VCCA
VCCB
B1
B2
OE
GND
TXB0102YZPR
P811
P810
SD1CMD_A
SD1CLK_A
R635 10K R0402
将MicroSD卡设置为1.8V信号电平后
通过P504更改SDCLK和SDCMD的电平
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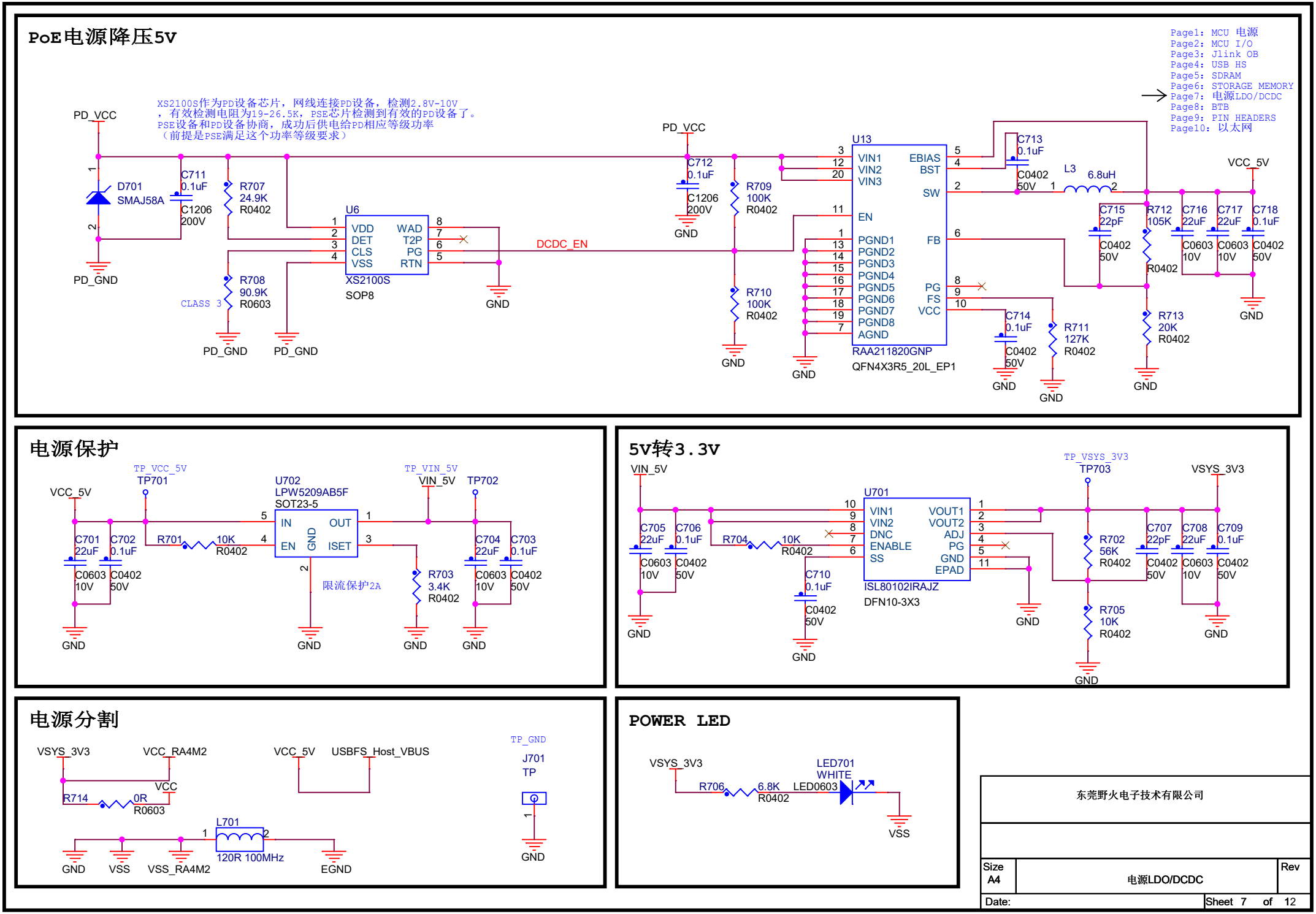
PoE电源降压5V
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XS2100S作为PD设备芯片，网线连接PD设备，检测2.8V-10V，有效检测电阻为19-26.5K，PSE芯片检测到有效的PD设备了。PSE设备和PD设备协商，成功后供电给PD相应等级功率（前提是PSE满足这个功率等级要求）
PD_VCC
D701 SMAJ58A
C711 0.1uF C1206 200V
R707 24.9K R0402
R708 90.9K R0603
CLASS 3
PD_GND
U6
VDD DET CLS VSS WAD T2P PG RTN
XS2100S
SOP8
DCDC_EN
C712 0.1uF C1206 200V
R709 100K R0402
R710 100K R0402
GND
U13
VIN1 VIN2 VIN3 EN PGND1 PGND2 PGND3 PGND4 PGND5 PGND6 PGND7 PGND8 AGND
EBIAS BST SW FB PG FS VCC
RAA211820GNP
QFN4X3R5_20L_EP1
C713 0.1uF
C0402 50V
L3 6.8uH
C715 22pF
R712 105K
C716 22uF C717 22uF C718 0.1uF
C0603 10V
VCC_5V
C714 0.1uF
R711 127K R0402
R713 20K R0402
电源保护
TP_VCC_5V
TP701
U702
LPW5209AB5F
SOT23-5
IN OUT EN GND ISET
TP_VIN_5V
VIN_5V TP702
C701 22uF C702 0.1uF
R701 10K R0402
C704 22uF C703 0.1uF
R703 3.4K R0402
限流保护2A
5V转3.3V
VIN_5V
TP_VSYS_3V3
TP703
VSYS_3V3
U701
VIN1 VIN2 DNC ENABLE SS
VOUT1 VOUT2 ADJ PG GND EPAD
ISL80102IRAJZ
DFN10-3X3
C705 22uF C706 0.1uF
R704 10K R0402
C710 0.1uF
R702 56K R0402
R705 10K R0402
C707 22pF C708 22uF C709 0.1uF
电源分割
VSYS_3V3
VCC_RA4M2
VCC_5V
USBFS_Host_VBUS
TP_GND
J701 TP
R714 0R R0603
VCC
L701
120R 100MHz
VSS
VSS_RA4M2
EGND
POWER LED
LED701 WHITE
R706 6.8K R0402
LED0603
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BTB座子

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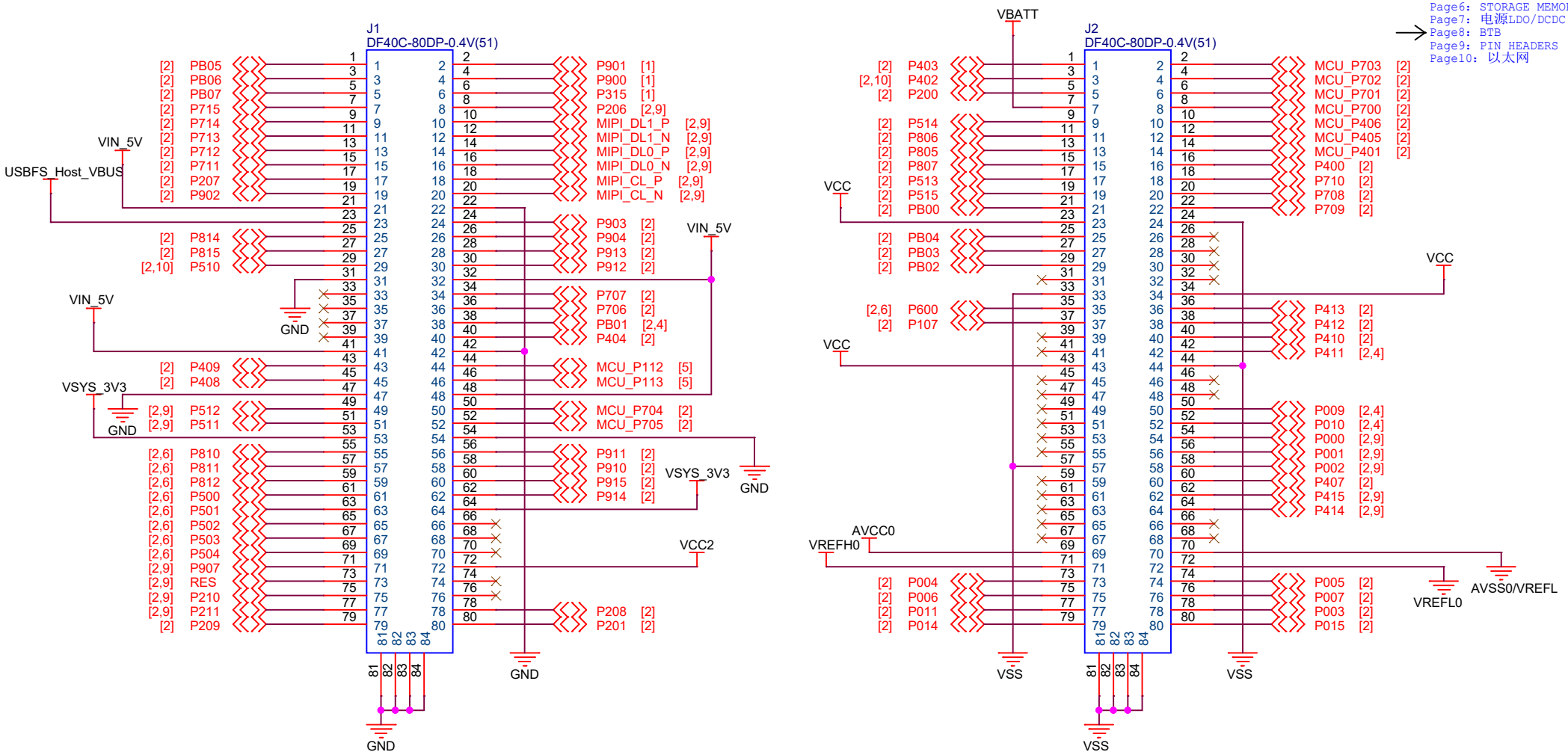
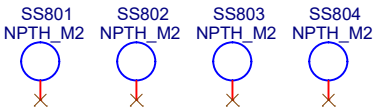


定位孔



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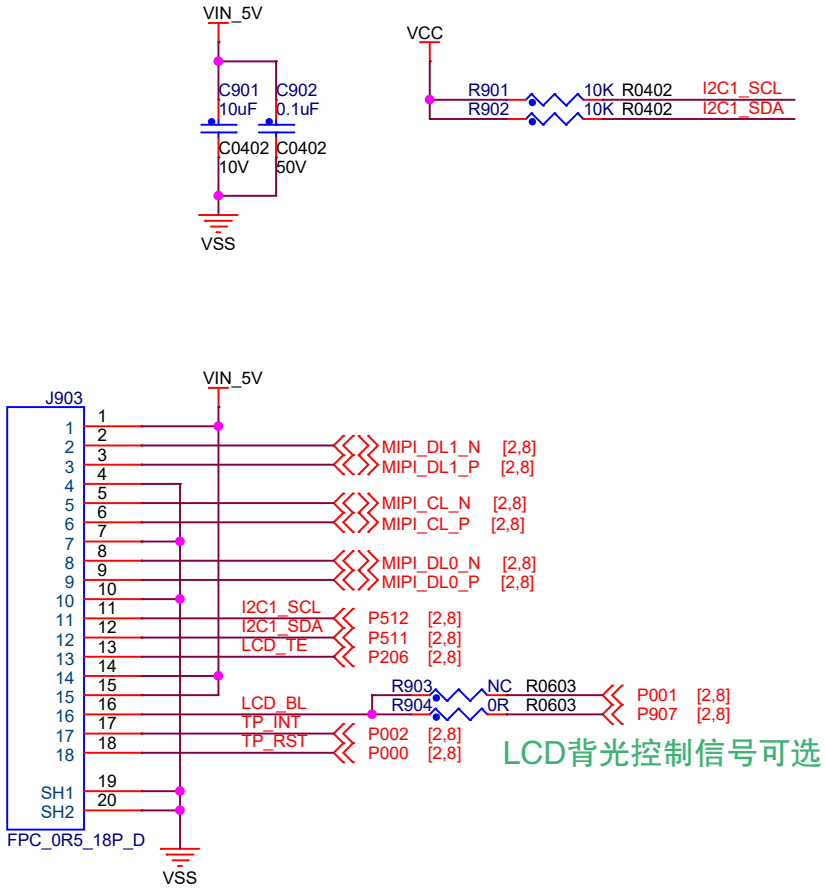
MIPI屏



PIN HEADERS

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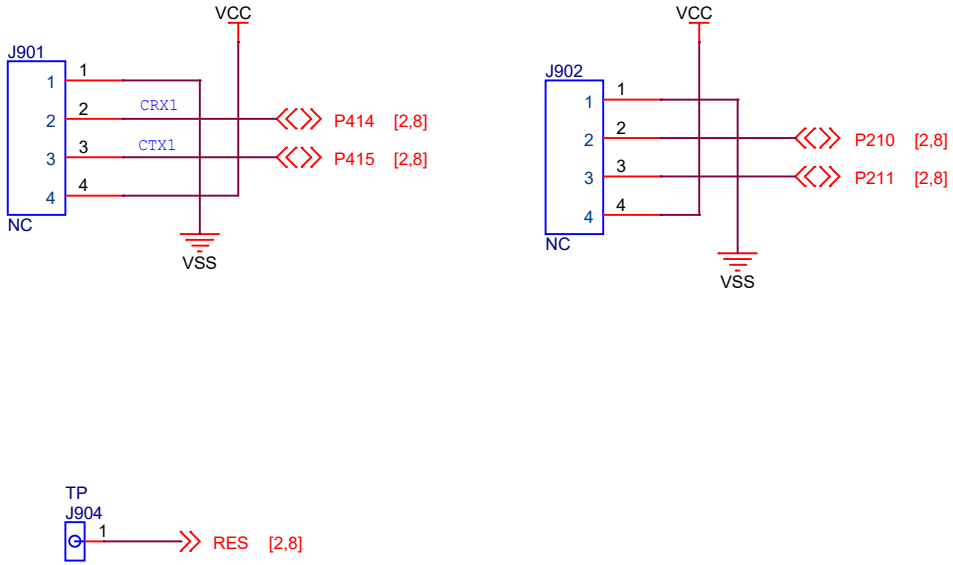

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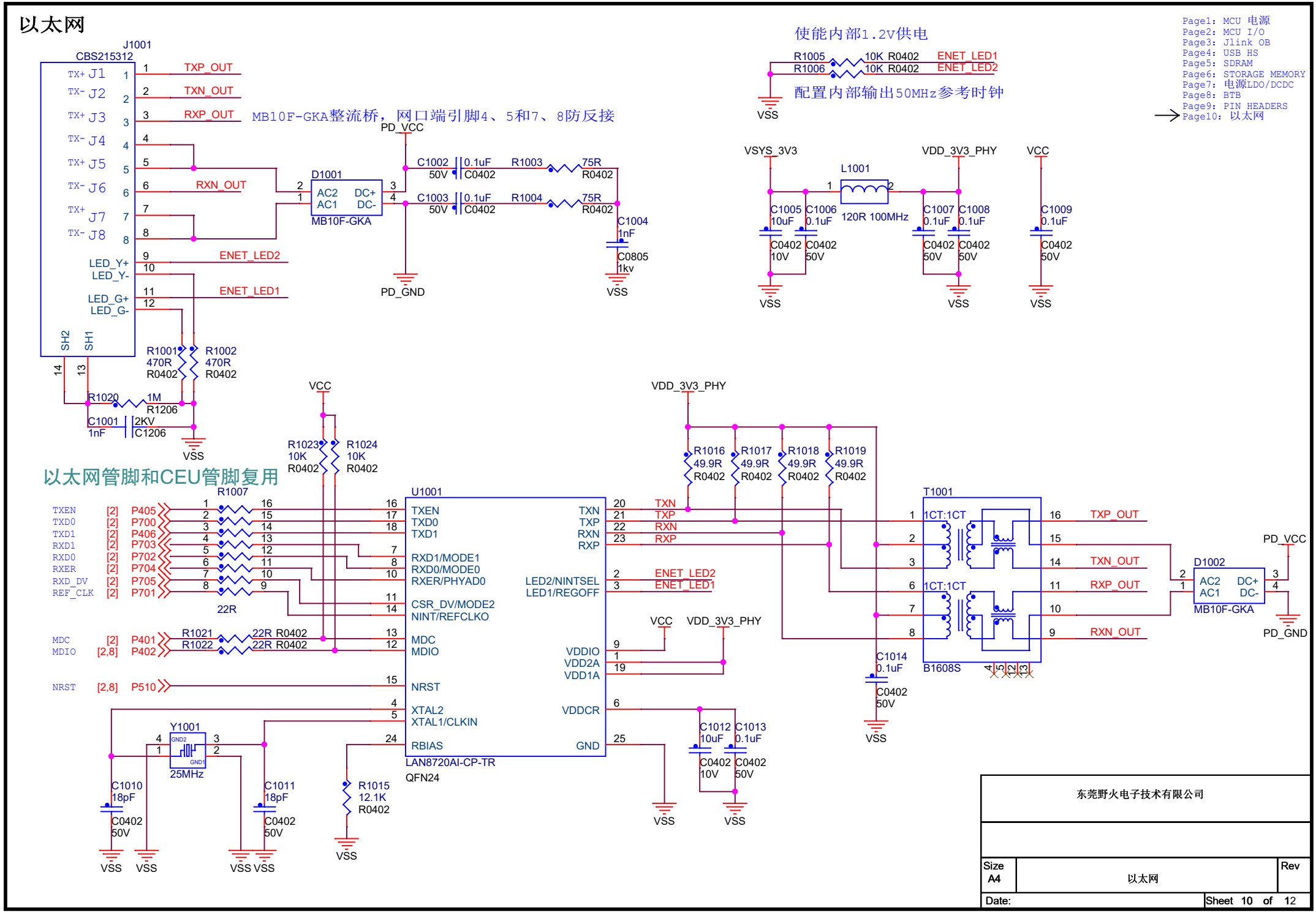
以太网



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历史版本

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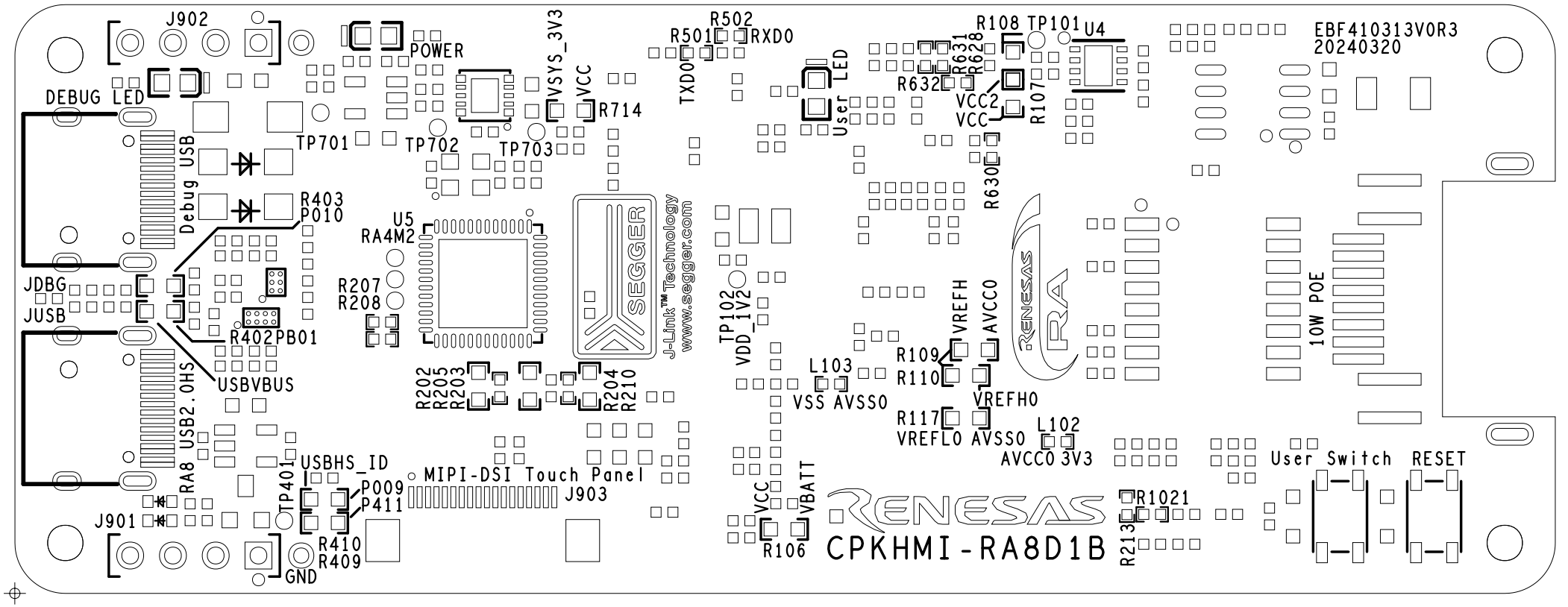
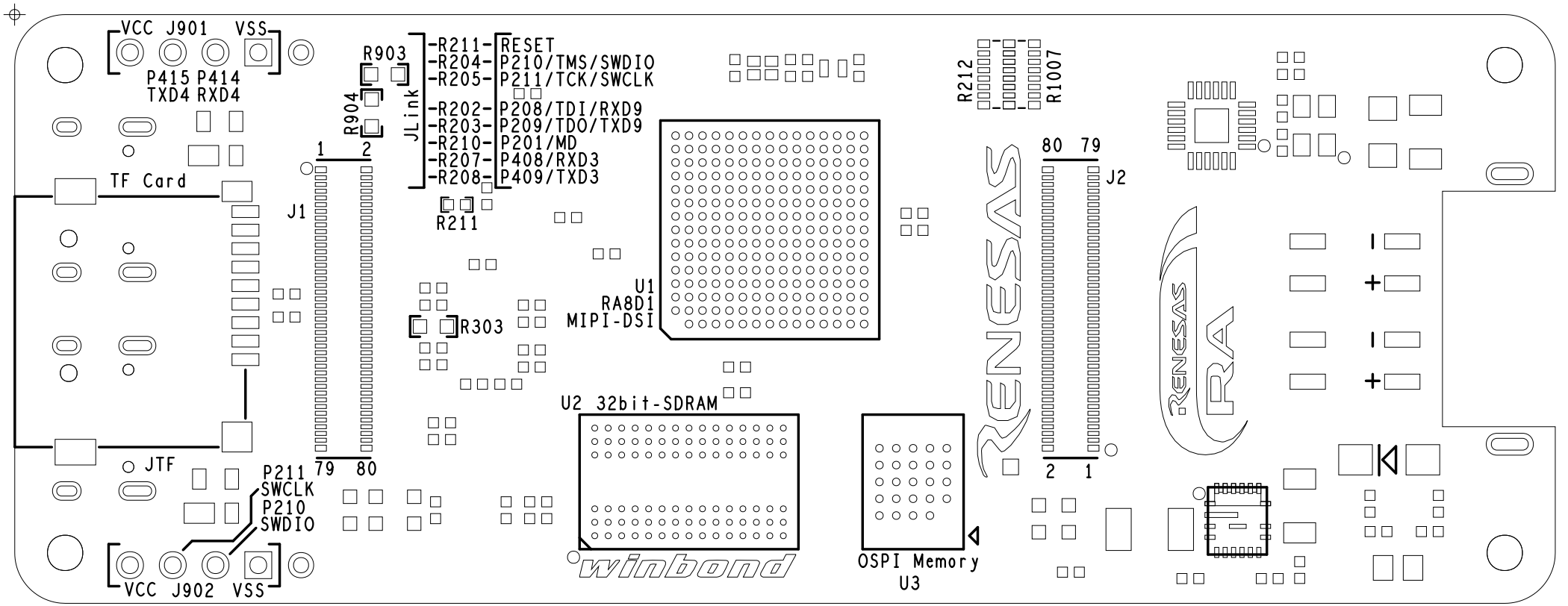
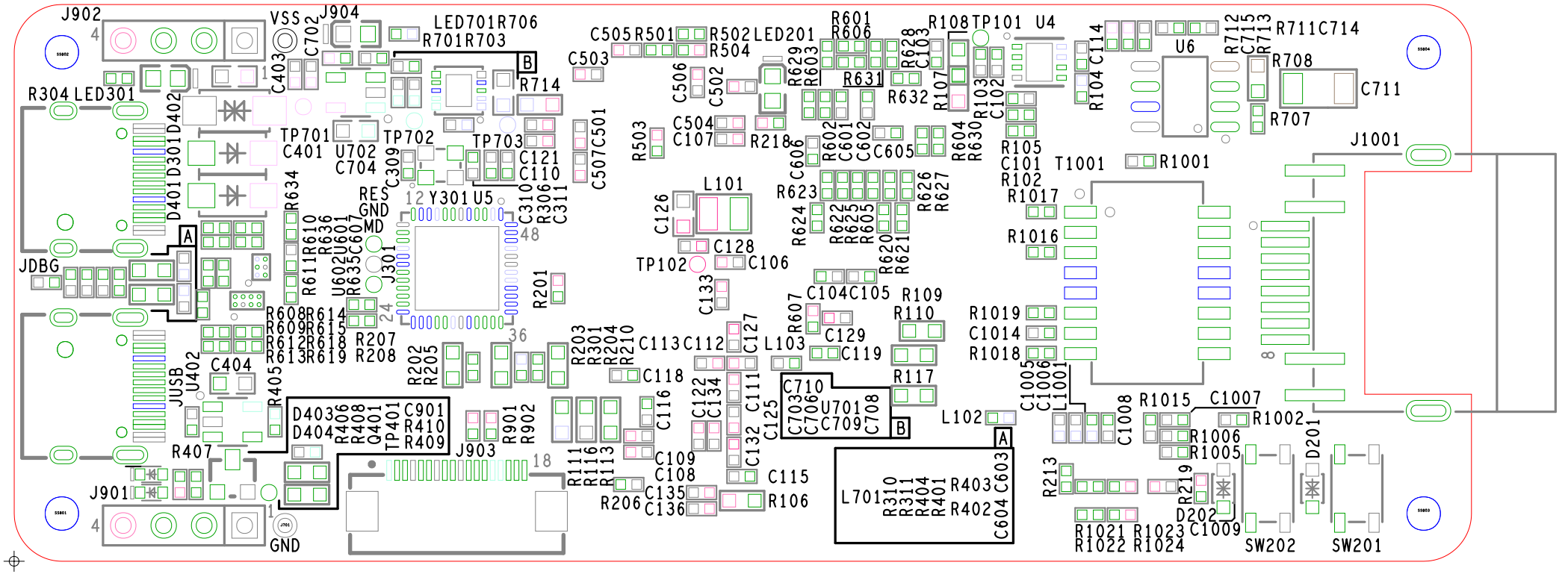
顶层丝印


J902
POWER
VSYS_3V3
VCC
R714
R501
R502
RXD0
TXD0
User LED
R108
TP101
U4
R631
R628
R632
VCC2
VCC
R107
R630
EBF410313V0R3
20240320
DEBUG LED
TP701
TP702
TP703
Debug USB
R403
P010
U5
RA4M2
R207
R208
JDBG
JUSB
R402
PB01
USBVBUS
RA8 USB2.0HS
R202
R205
R203
R204
R210
J-Link™ Technology
www.segger.com
TP102
VDD_1V2
VREFH
AVCC0
R109
R110
L103
VSS
AVSS0
VREFH0
R117
VREFL0
AVSS0
L102
AVCC0
3V3
10W POE
USBHS_ID
TP401
P009
P411
MIPI-DSI Touch Panel
J903
J901
R410
R409
GND
VCC
VBATT
R106
RENESAS
CPKHMI-RA8D1B
R1021
R213
User Switch
RESET

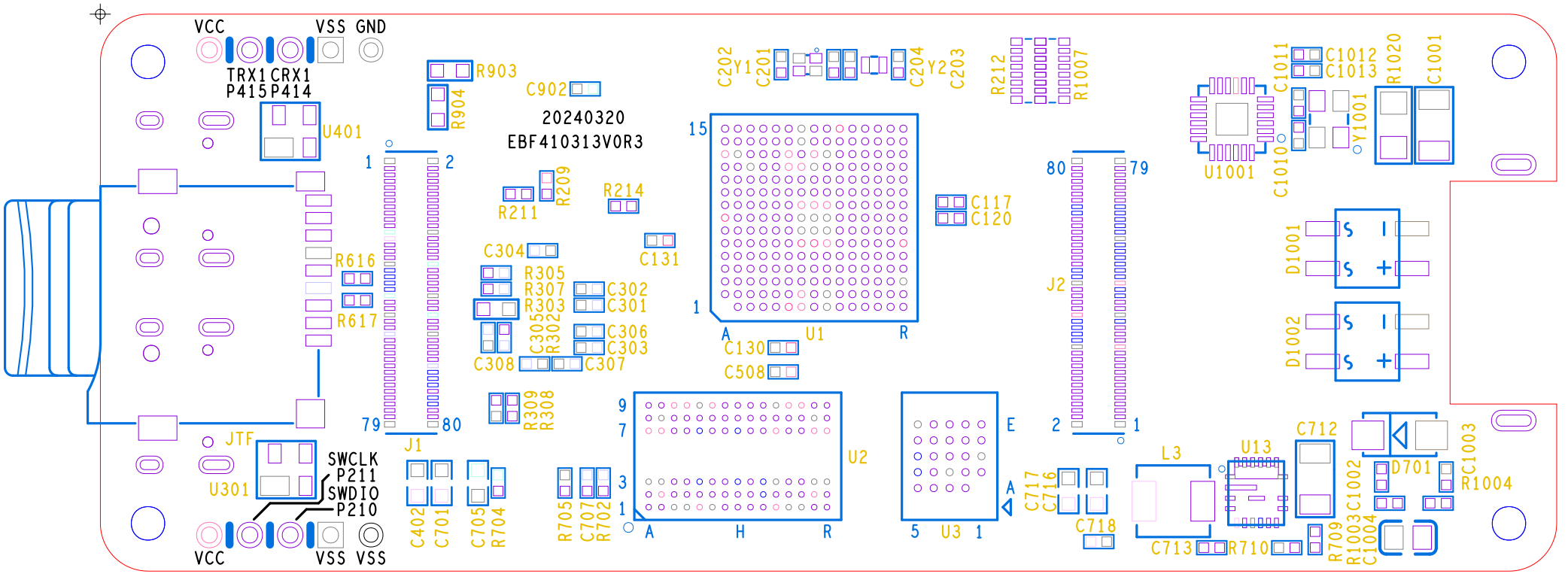
底层丝印


VCC J901 VSS
P415 P414
TXD4 RXD4
R903
R904
JLink
-R211- RESET
-R204- P210/TMS/SWDIO
-R205- P211/TCK/SWCLK
-R202- P208/TDI/RXD9
-R203- P209/TDO/TXD9
-R210- P201/MD
-R207- P408/RXD3
-R208- P409/TXD3
R211
TF Card
J1
1 2
79 80
R303
U1
RA8D1
MIPI-DSI
U2 32bit-SDRAM
JTF
P211
SWCLK
P210
SWDIO
VCC J902 VSS
OSPI Memory
U3
R212
R1007
80 79
J2
2 1

顶层器件摆放位置

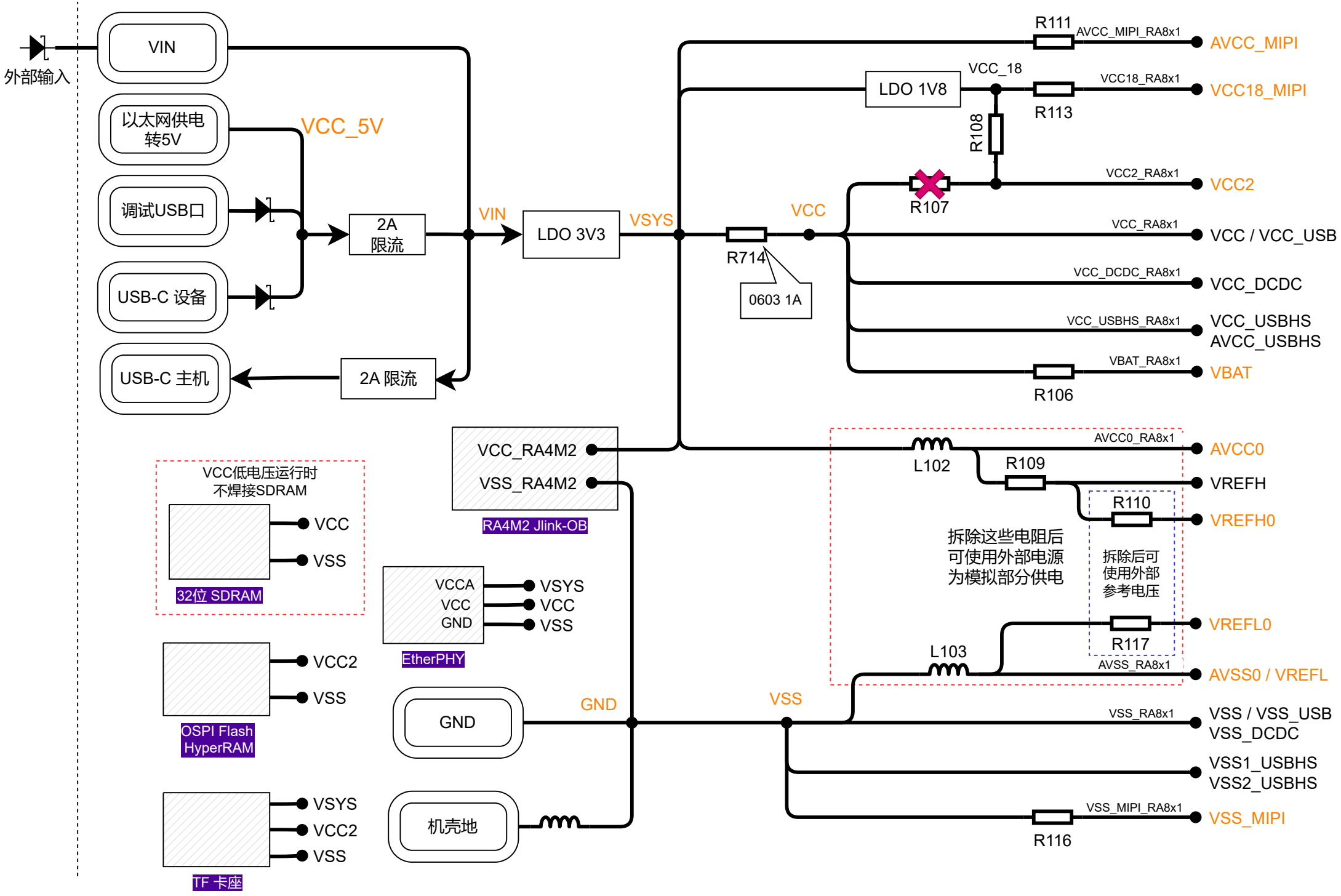

J902
VSS
J904
LED701R706
R701R703
C403
C702
R714
C505R501
R502LED201
R504
C503
R601
R606
R628
C103
R108TP101
U4
U6
R712
C715
R713
R711C714
R708
C711
R707
R304LED301
D402
D301
D401
TP701
C401
U702
C704
TP702
C309
TP703
C121
C110
C507C501
R503
C506
C502
R629
R603
R631
R632
R107
R103
C102
R104C114
C504
C107
R218
R602
C601
C602
C606
C605
R604
R630
R105
C101
R102
T1001
R1001
J1001
R634
RES
GND
MD
Y301U5
C310
R306
C311
L101
C126
R623
R624
R622
R625
R605
R626
R627
R1017
R1016
JDBG
R611R610
R636
U602U601
R635C607
J301
C128
TP102
C106
R620
R621
R201
C133
C104C105
R109
R110
R607
C129
C119
R1019
C1014
R1018
R608R614
R609R615
R612R618
R613R619
R207
R208
R202
R205
R203
R301
R204
R210
C113C112
C127
L103
C118
R117
C1005
C1006
L1001
C1008
R1015
C1007
R1002
JUSB
U402
C404
R405
D403
D404
R406
R408
Q401
TP401
C901
R410
R409
R901
R902
C116
C122
C134
C111
C125
C710
C703
C706
C709
U701
C708
L102
R1006
R1005
D201
R407
J903
R111
R116
R113
C109
C108
C132
C115
L701
R310
R311
R404
R401
R403
R402
C604
C603
R213
R219
D202
J901
R206
C135
C136
R106
R1021
R1022
R1023
R1024
C1009
SW202
SW201
GND

底层器件摆放位置


VCC
VSS GND
TRX1 CRX1
P415 P414
U401
R903
R904
C902
20240320
EBF410313V0R3
C202
Y1
C201
C204
Y2
C203
R212
R1007
C1011
C1012
C1013
R1020
C1001
U1001
C1010
Y1001
R209
R211
R214
C117
C120
C131
C304
R305
R307
R303
C302
C301
C305
R302
C306
C303
C308
C307
C130
C508
U1
R616
R617
J2
D1001
D1002
R309
R308
J1
JTF
U301
SWCLK
P211
SWDIO
P210
C402
C701
C705
R704
R705
C707
R702
U2
U3
C717
C716
C718
L3
U13
C712
D701
RC1003
R1004
C713
R710
R709
R1003
C1002
C1004
VCC
VSS VSS

CPKHMI-RA8D1B 电源拓扑

橙色标注的电源
都可以由外部输入

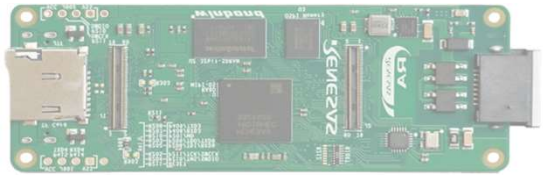


板对板连接器扩展示例，实际使用时可以按照贴装的芯片和应用需求灵活配置

J1

组	功能	端口	引脚	引脚	端口	功能	组
调试	BootTXD/TDO/SWO	P209	79	80	P201	MD	调试
调试	TCK/SWCLK	P211	77	78	P208	TDI/BootRXD	调试
调试	TMS/SWDIO	P210	75	76	NC		
	RESET		73	74	NC		
SDHI	SD nRESET	P907	71	72	VCC2		
SDHI	SD1WP	P504	69	70	NC		
SDHI	SD1CD	P503	67	68	NC		
SDHI	SD1DAT3	P502	65	66	NC		
SDHI	SD1DAT2	P501	63	64	VSYSY_3V3		
SDHI	SD1DAT1	P500	61	62	P914	LCD D0	RGB666 LCD
SDHI	SD1DAT0	P812	59	60	P915	LCD D1	RGB666 LCD
SDHI	SD1CMD	P811	57	58	P910	LCD D2	RGB666 LCD
SDHI	SD1CLK	P810	55	56	P911	LCD D3	RGB666 LCD
	VSYSY_3V3		53	54	GND		
CAN-FD	CRX1	P511	51	52	P705*	CRX0	CAN-FD
CAN-FD	CTX1	P512	49	50	P704*	CTX0	CAN-FD
	GND		47	48	VIN_5V		
I2C	I2C0 SCL	P408	45	46	P113	SDRAM CKE	
I2C	I2C0 SDA	P409	43	44	P112	SDRAM DQM1	
	VIN_5V		41	42	GND		
		NC	39	40	P404	GPIO/INT	
		NC	37	38	PB01	USB HS VBUS	
		NC	35	36	P706	RXD1	UART
		NC	33	34	P707	TXD1	UART
	GND		31	32	VIN_5V		
	GPIO	P510	29	30	P912	LCD D4	RGB666 LCD
全速	USB FS D-	P815	27	28	P913	LCD D5	RGB666 LCD
全速	USB FS D+	P814	25	26	P904	LCD D6	RGB666 LCD
	VCC_5V		23	24	P903	LCD D7	RGB666 LCD
	VIN_5V		21	22	GND		
RGB666 LCD	LCD D8	P902	19	20	MIPI CLK-		MIPI-DSI LCD
RGB666 LCD	LCD D9	P207	17	18	MIPI CLK+		MIPI-DSI LCD
RGB666 LCD	LCD D10	P711	15	16	MIPI DL0-		MIPI-DSI LCD
RGB666 LCD	LCD D11	P712	13	14	MIPI DL0+		MIPI-DSI LCD
RGB666 LCD	LCD D12	P713	11	12	MIPI DL1-		MIPI-DSI LCD
RGB666 LCD	LCD D13	P714	9	10	MIPI DL1+		MIPI-DSI LCD
RGB666 LCD	LCD D14	P715	7	8	DSI TE		MIPI-DSI LCD
RGB666 LCD	LCD D15	PB07	5	6	MIPI VCC18		MIPI-DSI LCD
RGB666 LCD	LCD D16	PB06	3	4	MIPI VSS		MIPI-DSI LCD
RGB666 LCD	LCD D17	PB05	1	2	MIPI AVCC		MIPI-DSI LCD

顶视图
Top View



底面透视图

*：带*号的引脚需要修改板上的R212/R1007电阻贴装后才能使用

J1，J2 的电源信号说明

VIN_5V	外部5V电源输入
VCC_5V	向外输出5V，供扩展板USB接口使用
VSYS_3V3	向外输出3.3V，U701 LDO的输出电压
VCC	向外输出VCC，板上通过R714连接VSYS_3V3
VCC2	向外输出VCC2
VBATT	断开R106后，可由外部输入VBATT
GND	地信号，同VSS
VSS	地信号，同GND
AVCC0	输出。也可断开L102后，可由外部输入AVCC0
AVSS0	输出。也可断开L103后，可由外部输入AVSS0
AVREFH0	输出。也可断开R110后，可由外部输入AVREFH0
AVREFL0	输出。也可断开R117后，可由外部输入AVREFL0

J2

组	功能	端口	引脚	引脚	端口	功能	组
CEU摄像头	VIO D7	P703*	2	1	P403	VIO XCLK	
CEU摄像头	VIO D6	P702*	4	3	P402	GPIO/RTCIC1	
CEU摄像头	VIO D5	P701*	6	5	P200	NMI	
CEU摄像头	VIO D4	P700*	8	7	VBATT		
CEU摄像头	VIO D3	P406*	10	9	P514	LCD ExtCLK	RGB666 LCD
CEU摄像头	VIO D2	P405*	12	11	P806	LCD DotCLK	RGB666 LCD
CEU摄像头	VIO D1	P401	14	13	P805	LCD TCON0	RGB666 LCD
CEU摄像头	VIO D0	P400	16	15	P807	LCD TCON1	RGB666 LCD
CEU摄像头	VIO VD	P710	18	17	P513	LCD TCON2	RGB666 LCD
CEU摄像头	VIO CLK	P708	20	19	P515	LCD TCON3	RGB666 LCD
CEU摄像头	VIO HD	P709	22	21	PB00	GPIO	
	VSS		24	23	VCC		
		NC	26	25	PB04	GPIO	
		NC	28	27	PB03	GPIO	
		NC	30	29	PB02	GPIO	
		NC	32	31	NC		
	VCC		34	33	VSS		
SPI	SSLB	P413	36	35	P600	GPIO	
SPI	RSPCKB	P412	38	37	P107	GPIO	
SPI	MISOB	P410	40	39	NC		
SPI	MOSIB	P411	42	41	NC		
	VSS		44	43	VCC		
		NC	46	45	NC		
		NC	48	47	NC		
	USB HS ID	P009	50	49	NC		
	GPIO/INT	P010	52	51	NC		
	GPIO/INT	P000	54	53	NC		
	GPIO/INT	P001	56	55	NC		
	GPIO/INT	P002	58	57	VSS		
PWM	GTIOC10B	P407	60	59	NC		
PWM	GTIOC0A	P415	62	61	NC		
PWM	GTIOC0B	P414	64	63	NC		
		NC	66	65	NC		
		NC	68	67	NC		
	AVSS0		70	69	AVCC0		
	VREFL0		72	71	VREFH0		
Analog	AN001	P005	74	73	P004	AN000	Analog
Analog	AN004	P007	76	75	P006	AN002	Analog
Analog	AN104	P003	78	77	P011	AN106	Analog
Analog	DA1/AN105	P015	80	79	P014	AN007/DA0	Analog