

SoM Schematic For RK3399Pro

RK3399Pro_SoM_V1.0

PMIC: RK809-3 (5BUCK + 9LDO + Codec)
RAM: LPDDR3
ROM: eMMC + TF card
Interface: MIPI CSI/MIPI DSI/UART/I2S/RMII/LCDC/PCIE/USB2/TYPEC

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14.RK3399 Pro RGMII/LCDC/CIF
15.POWER_PMIC RK809-3
16.POWER_CPU/GPU/NPUt
17.NPU RAM LPDDR3 1X32bit
18.RAM LPDDR3 2X16bit
19.EMMC
20.RGMII-10/100/1000M
21.CONNECTOR
22.EFUSE

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

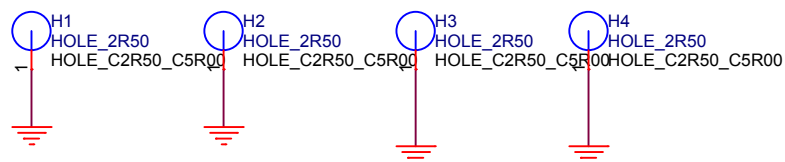
NOTE 2: Please use our recommended components to avoid too many changes.For more informations about the second source,please refer to our AVL.

Note

Option

Description

Remind

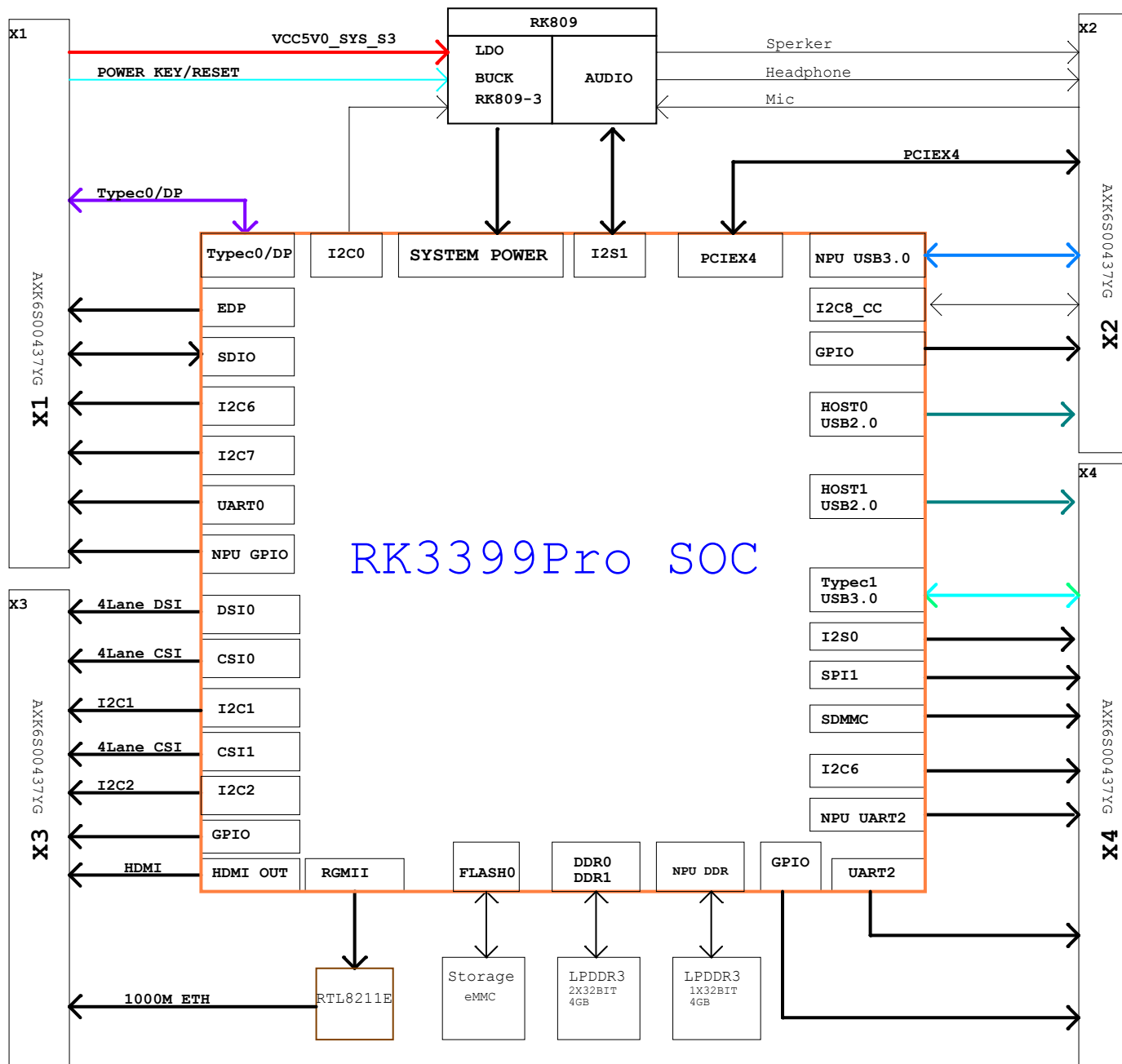


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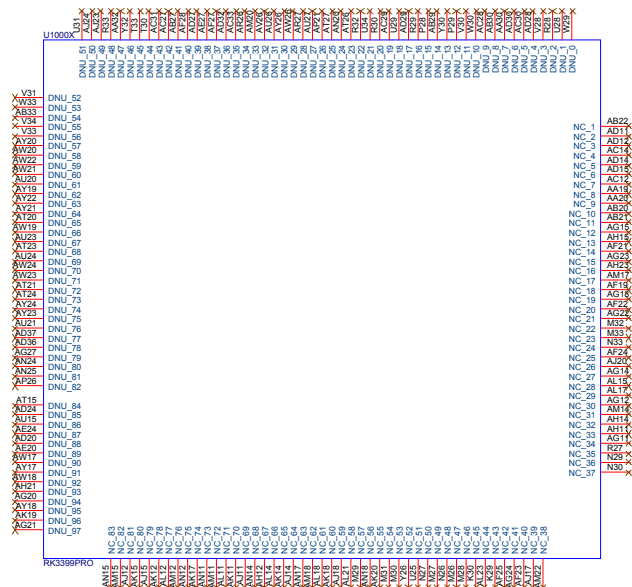
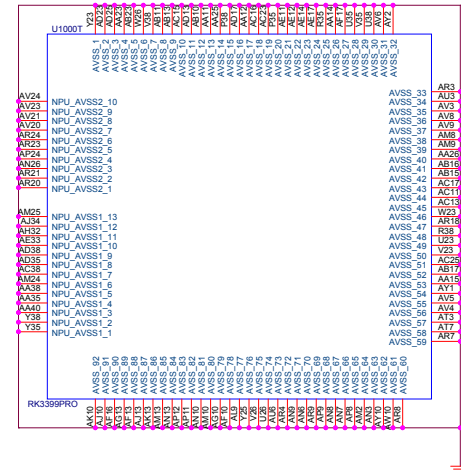
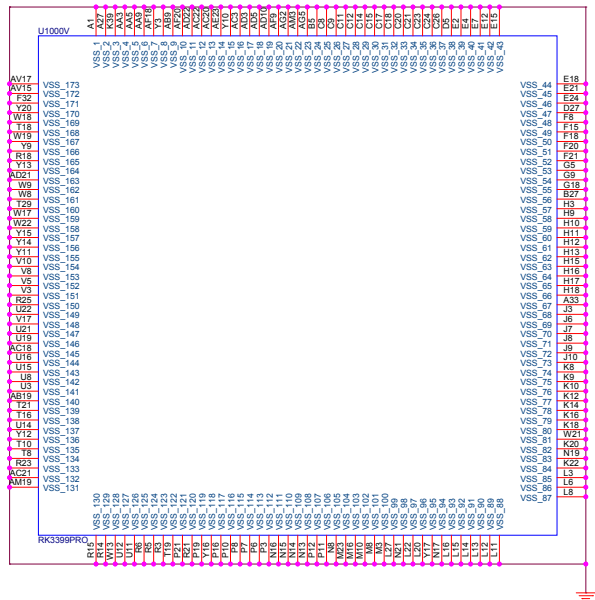
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项目:	SYSTEM ON MODULE BOARD			
文件:	RK3399Pro_SOM_SCH			
图纸:	01.Index			
修改日期:	Tuesday, June 04, 2019	版本:	V0.9	
设计者:	ziang.chen	页码:	1 of 22	

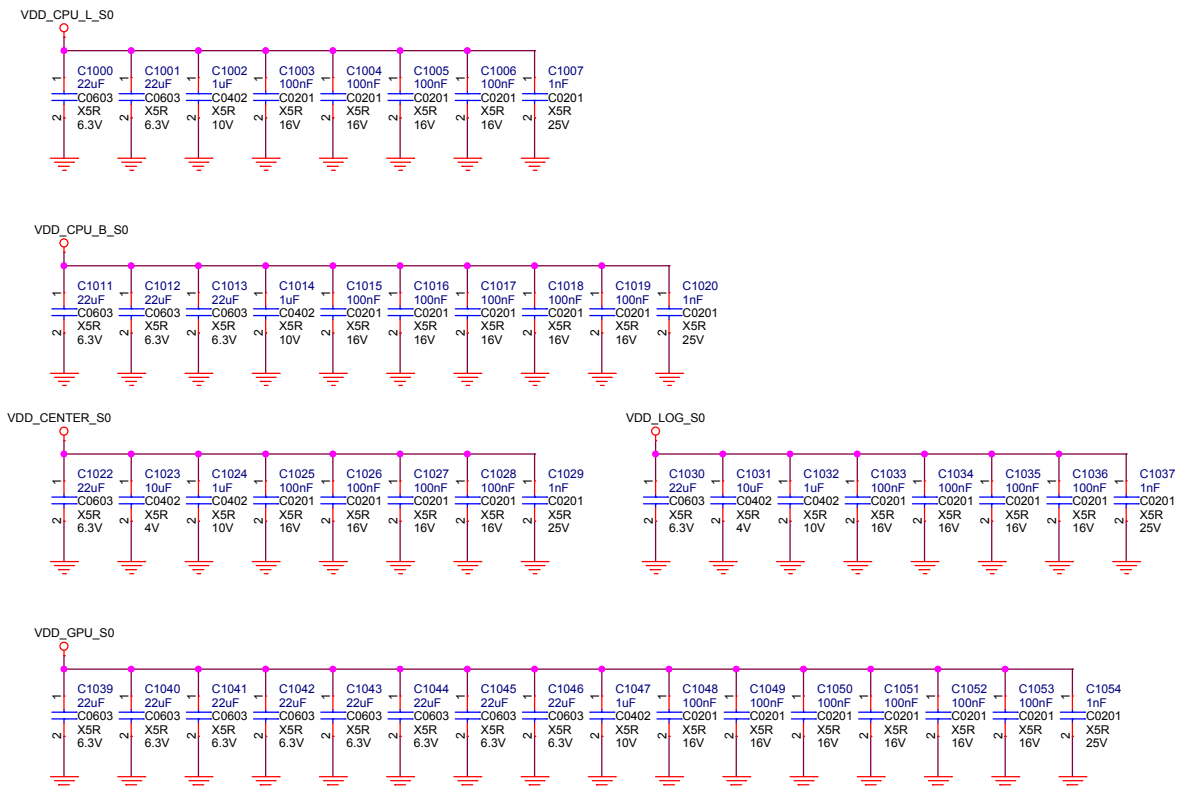
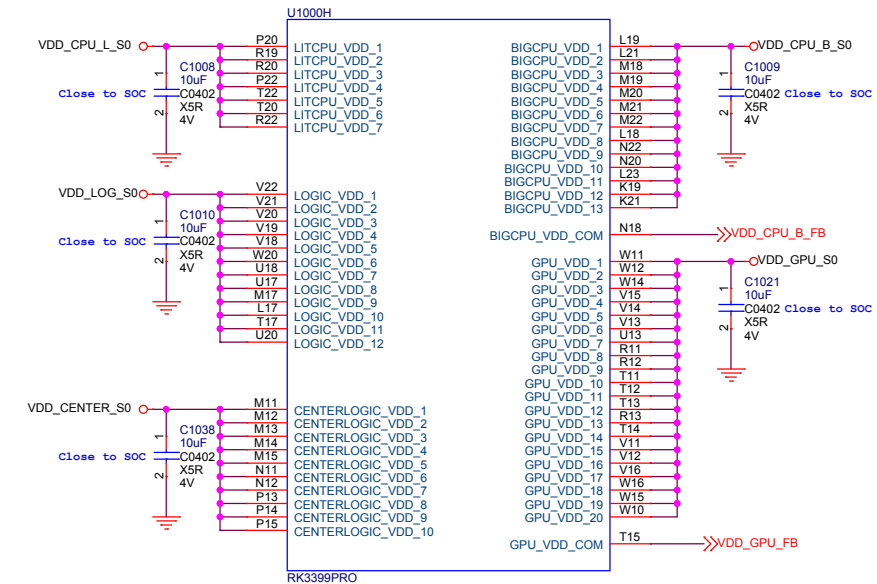
Version	Date	Author	Change List	Approved
<i>v0.9</i>	<i>20181223</i>		<i>First edition for RK3399Pro</i>	<i>cza</i>



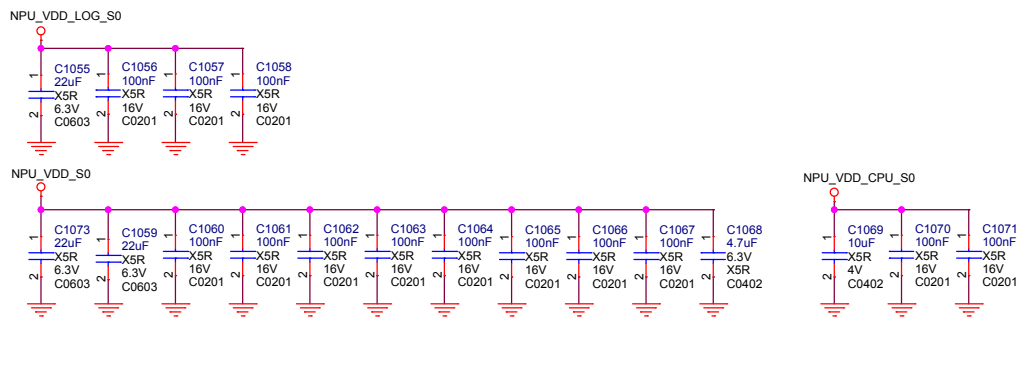
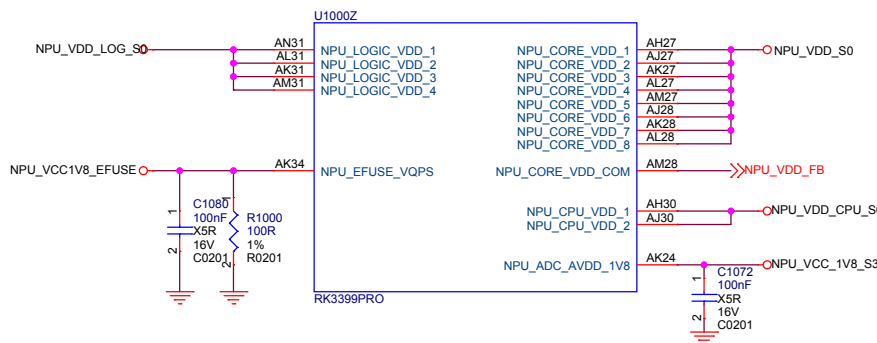
NC



Power

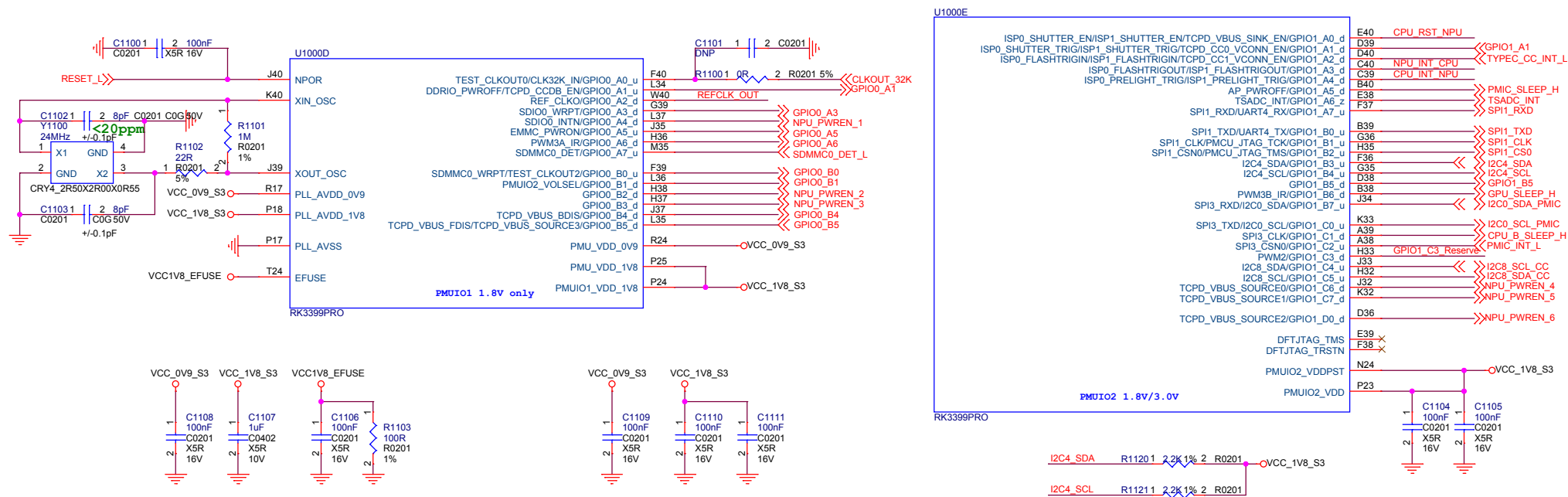


NPU Power

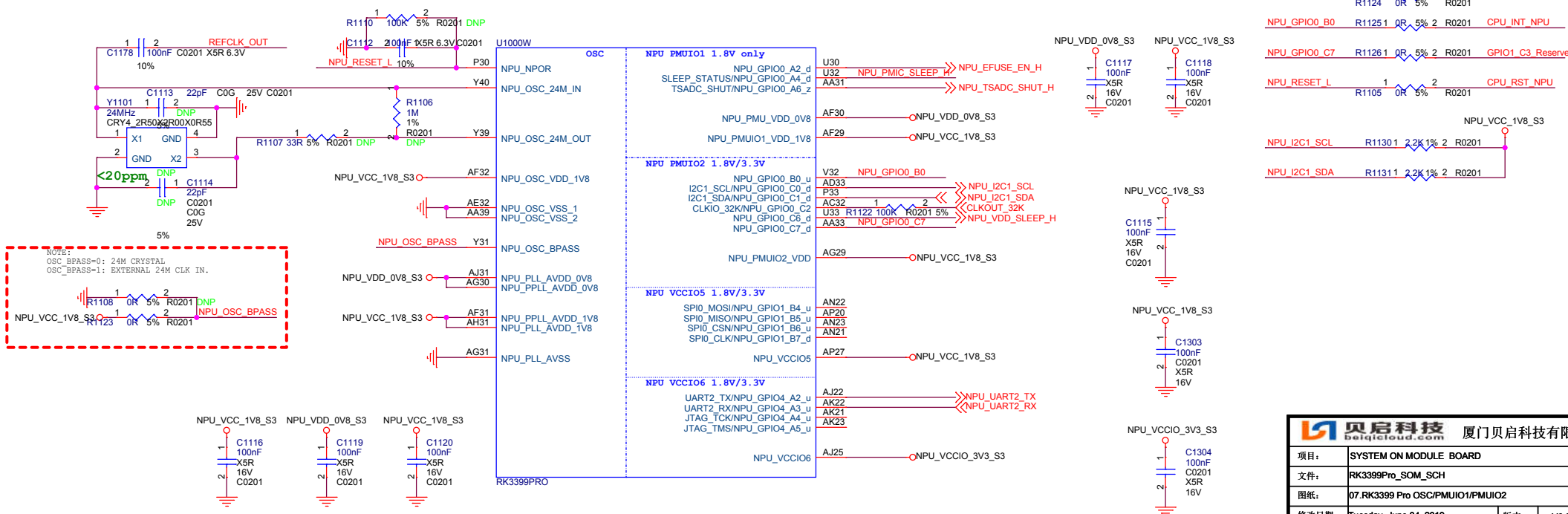


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项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	08.RK3399 Pro Power		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	6 of 22

PMUIO1/PMUIO2

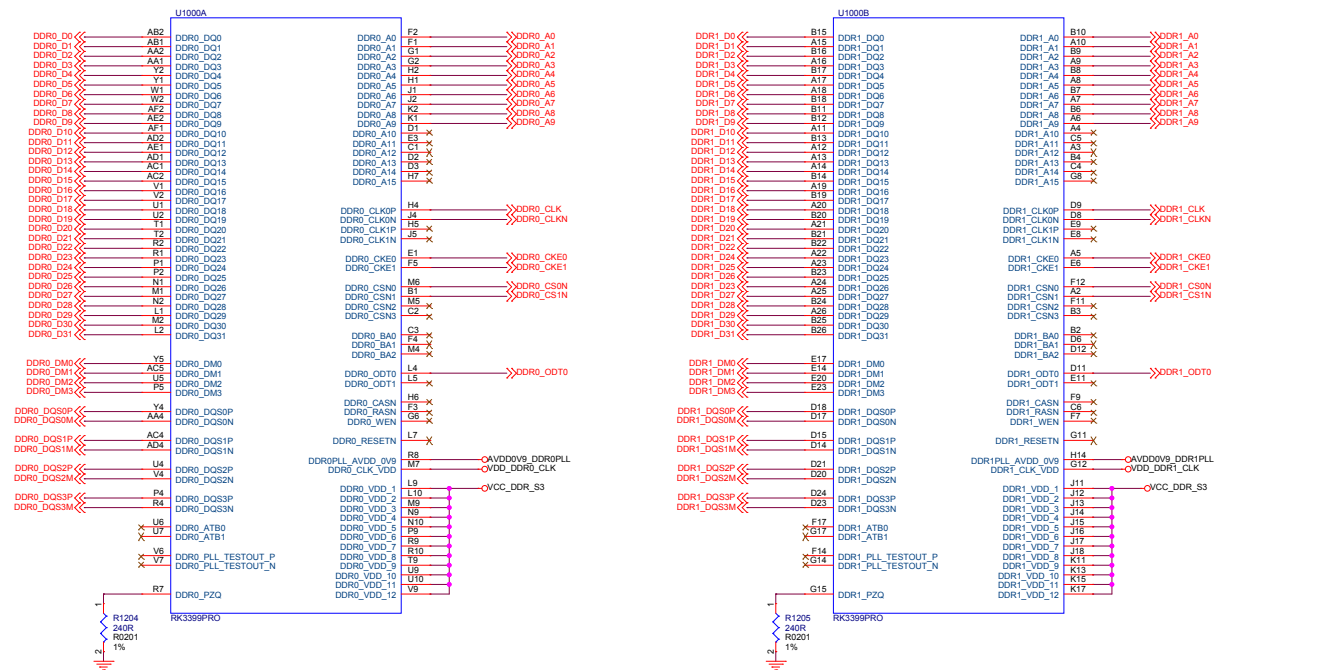


NPU PMUIO1/PMUIO2/GPIO

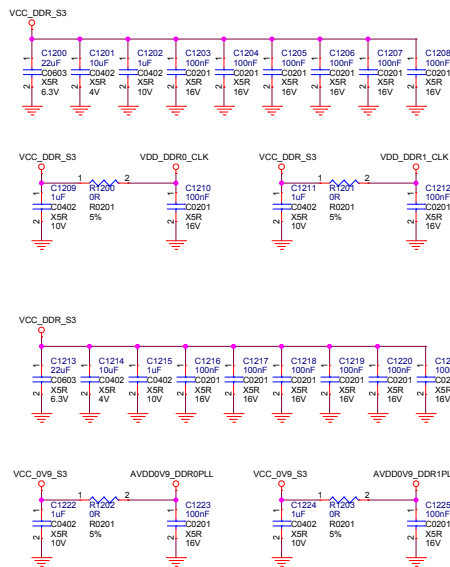


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文件:	RK3399Pro_SOM_SCH		
图纸:	07_RK3399 Pro OSC/PMUIO1/PMUIO2		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	7 of 22

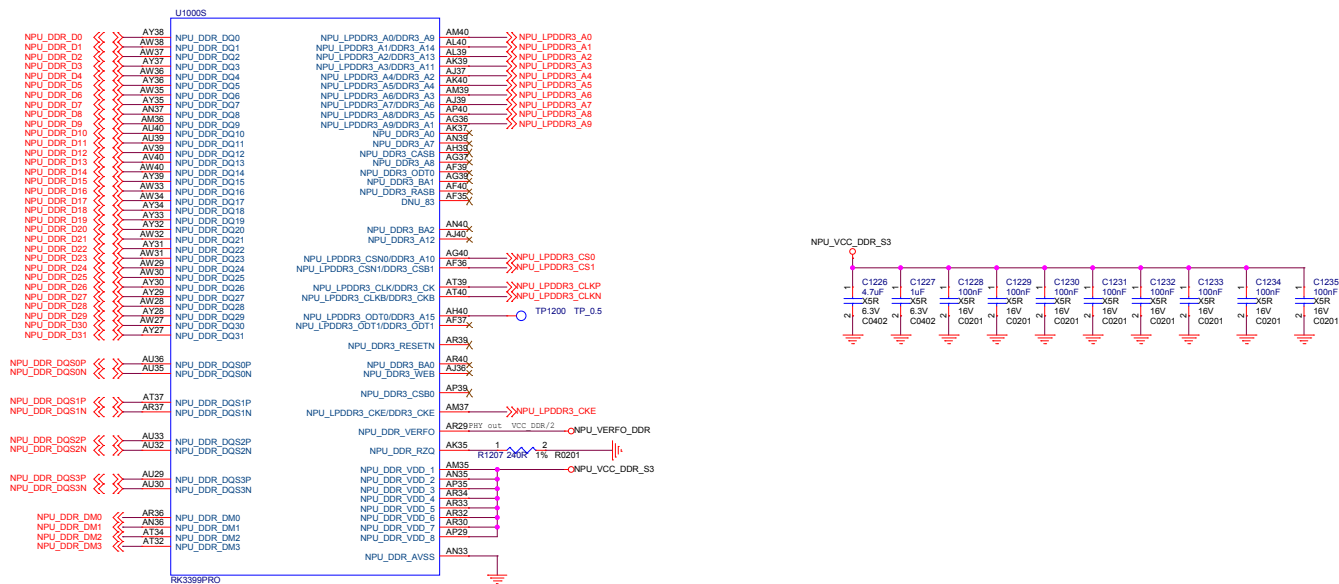
DDR Controller



DDR FILTER

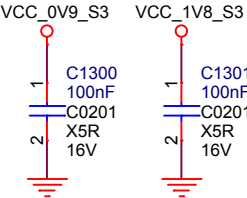
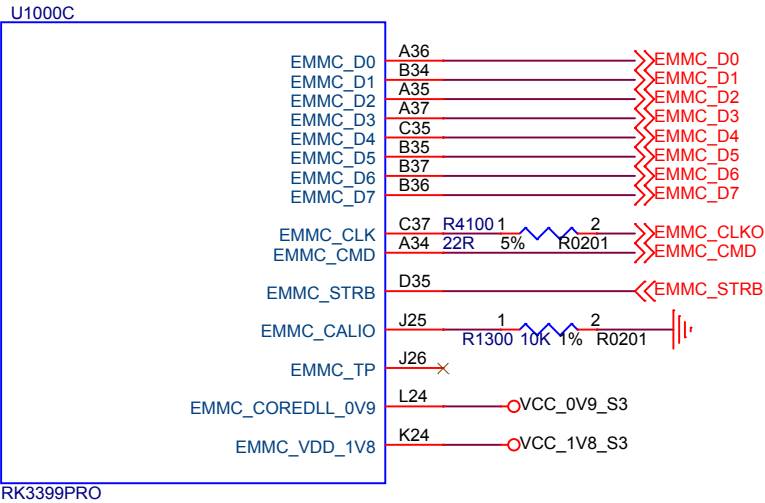


NPU DDR Controller



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
	RA5B
	CSB0
	BA2
	A12
	BA0
	WEB
CK	CK
CKB	CKB
CKE	CKE
CSB0	A10
CSB1	CSB1
ODT0	A15
ODT1	ODT1
	RESETN

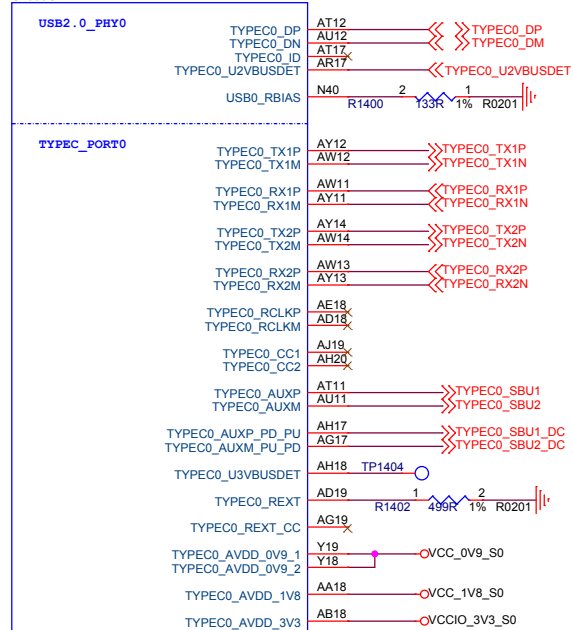
EMMC



项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	09.RK3399 Pro EMMC		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	9 of 22

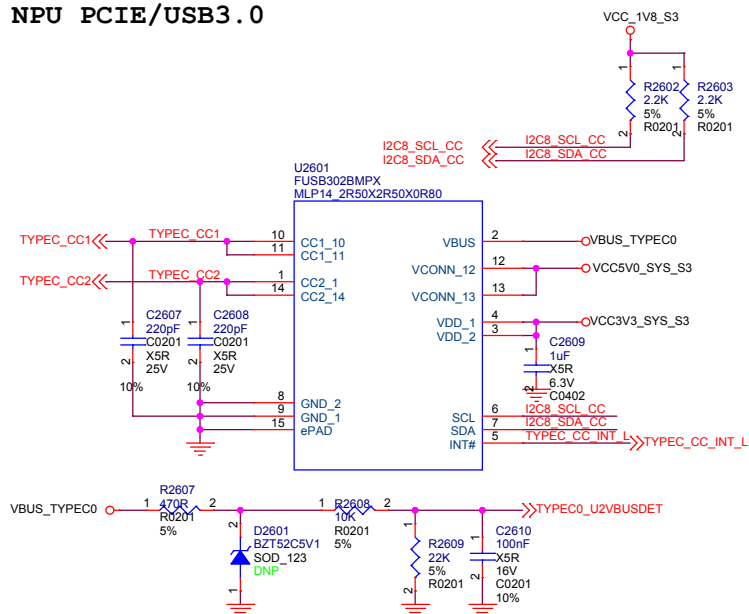
USB/TYPEC

U1000G



RK3399PRO

NPU PCIE/USB3.0



U1000F

USB2.0_HOST

USB20_HOST0_DP M39 <>> HOST0_DP
USB20_HOST0_DN M40 <>> HOST0_DM
USB20_HOST1_DP L39 <>> HOST1_DP
USB20_HOST1_DN L40 <>> HOST1_DM

ALL USB2.0 POWER

USB20_AVDD_0V9 V24 1 2 5% R0201
USB20_AVDD_1V8 Y24 1 2 5% R0201
USB20_AVDD_3V3 Y24 1 2 5% R0201

USB2.0_OTG1

USB20_OTG1_DP AT14 <>> TYPEC1_DP
USB20_OTG1_DN AU14 <>> TYPEC1_DM
USB20_OTG1_ID AE28 <>> TP1420
USB20_OTG1_VBUS AU17 <>> TP1421

USB3.0

USB30_TX1P AY16 <>> TYPEC1_TX1P
USB30_TX1M AW16 <>> TYPEC1_TX1N
USB30_RX1P AW15 <>> TYPEC1_RX1P
USB30_RX1M AY15 <>> TYPEC1_RX1N

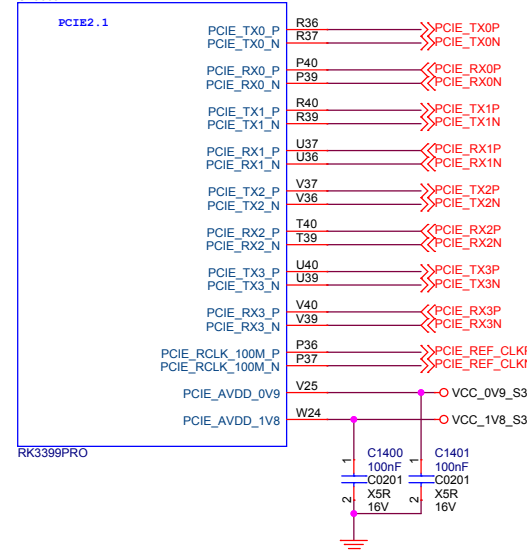
USB30_REXT AE21 1 2 1% R0201
Y21 <>> VCC_0V9_S0
Y22 <>>
AA21 <>> VCC_1V8_S0
AA22 <>> VCCIO_3V3_S0

NOTE: Pin Y24 and Pin AA22 connected to together internal.

NOTE: Pin Y24 and Pin AA22 connected to together internal.

PCIE

U1000J



USIC

U1000M



RK3399PRO

U1000Y RK3399PRO

NPU USB OTG/HOST

NPU_USB2_OTG_DP AC36 <>> NPU_USB1_DP
NPU_USB2_OTG_DM AC37 <>> NPU_USB1_DM
NPU_USB2_OTG_ID AC35 TP1407
NPU_USB2_OTG_VBUS AC34 TP 0.5
NPU_USB2_AVDD_0V8 AJ33 <>> PNPV_VDD_0V8_S3
NPU_USB2_AVDD_1V8 AL33 <>> PNPV_VDD_0V8_S3
NPU_USB2_AVDD_3V3 AK33 <>> PNPV_VCC_1V8_S3

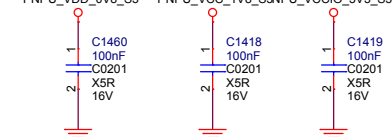
NPU USB3/PCIE2.0 PHY


NPU_PCIE_TX0P/USB3_SSTXP AC39 <>> NPU_USB3_SSTXP
NPU_PCIE_TX0N/USB3_SSTXP AC40 <>> NPU_USB3_SSTXP
NPU_PCIE_RX0P/USB3_SSRXP AD39 <>> NPU_USB3_SSRXP
NPU_PCIE_RX0N/USB3_SSRXP AD40 <>> NPU_USB3_SSRXP
NPU_PCIE_TX1P AA36 <>>
NPU_PCIE_TX1N AA37 <>>
NPU_PCIE_RX1P Y36 <>>
NPU_PCIE_RX1N Y37 <>>
NPU_PCIE_REFCLKP AB39 <>>
NPU_PCIE_REFCLKN AB40 <>>
NPU_PCIE/USB3_RBIAS AD34 1 2 1% R0201
NPU_PCIE/USB3_VCCA_0V8 AH33 <>> NPU_VDD_0V8_S3
NPU_PCIE/USB3_VCCD_0V8 AG33 <>> NPU_VCC_1V8_S3
NPU_PCIE/USB3_VDDREF_0V8 AF33 <>>

NPU_VDD_0V8_S3 NPU_VCC_1V8_S3

C1416 100nF C0201 X5R 16V
C1417 100nF C0201 X5R 16V

PNPU_VDD_0V8_S3 PNPU_VCC_1V8_S3PNPU_VCCIO_3V3_S3



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项目:	SYSTEM ON MODULE BOARD
文件:	RK3399Pro_SOM_SCH
图框:	10.RK3399 Pro USB2.0/TYPEC/PCIE
修改日期:	Tuesday, June 04, 2019
设计者:	zhang.chen
版本:	V0.9
页码:	10 of 22

GPIO

U1000N

I2C3_SDA/UART2B_RX/GPIO4_C0_u
I2C3_SCL/UART2B_TX/GPIO4_C1_u
PWM0/VOP0_PWM/VOP1_PWM/GPIO4_C2_d
UART2C_RX/GPIO4_C3_u
UART2C_TX/GPIO4_C4_u
SPDIF_TX/GPIO4_C5_d
PWM1/GPIO4_C6_d
HDMI_CECINOUT/EDP_HOTPLUG/GPIO4_C7_u

PCIE_CLKREQNB/GPIO4_D0_u
DP_HOTPLUG/GPIO4_D1_d
GPIO4_D2_d
GPIO4_D3_d
GPIO4_D4_d
GPIO4_D5_d
GPIO4_D6_d

APIO4 1.8V/3.0V

I2S0_SCLK/GPIO3_D0_d
I2S0_LRCK_RX/GPIO3_D1_d
I2S0_LRCK_TX/GPIO3_D2_d
I2S0_SDI0/GPIO3_D3_d
I2S0_SDI1SDO3/GPIO3_D4_d
I2S0_SDI2SDO2/GPIO3_D5_d
I2S0_SDI3SDO1/GPIO3_D6_d
I2S0_SDO0/GPIO3_D7_d

I2S_CLK/GPIO4_A0_d
I2C1_SDA/GPIO4_A1_u
I2C1_SCL/GPIO4_A2_u
I2S1_SCLK/GPIO4_A3_d
I2S1_LRCK_RX/GPIO4_A4_d
I2S1_LRCK_TX/GPIO4_A5_d
I2S1_SDI0/GPIO4_A6_d
I2S1_SDO0/GPIO4_A7_d

APIO5 1.8V/3.0V

RK3399PRO

AF6 I2C3_SDA_HDMI
AK2 I2C3_SCL_HDMI
AF5 LCD_BL_PWM
AK3 UART2_RX_DEBUG
AJ4 UART2_TX_DEBUG
AM1 GPIO4_C5
AG6 GPIO4_C6
AD7 HDMI_CEC

AJ3 GPIO4_D0
AK4 GPIO4_D1
AG4 GPIO4_D2
AM4 EFUSE_VQPS_EN_H
AM5 LCD_BL_EN_H
AL2 LCD_PWREN_H
AF4

AG3 I2S0_SCLK
AK1 I2S0_LRCK_RX
AJ2 I2S0_LRCK_TX
Y7 I2S0_SDI0
AL1 GPIO3_D4
AA6 GPIO3_D5
AH2 I2S0_SDI3
AJ1 I2S0_SDO0

AC7 I2S_CLK
AG1 I2C1_SDA_1V8
Y6 I2C1_SCL_1V8
AF3 I2S1_SCLK
AA7 I2S1_LRCK
AH1 I2S1_SDI
AD6 I2S1_SDO
AC6

AA8 VCC_1V8_S0
Y8

I2C1_SDA_1V8 R1551 1 2.2K 5% 2 R0201
I2C1_SCL_1V8 R1552 1 2.2K 5% 2 R0201
I2C3_SDA_HDMI R1553 1 2.2K 5% 2 R0201
R1554 1 DNP 5% 2 R0201
I2C3_SCL_HDMI R1555 1 DNP 5% 2 R0201
R1556 1 2.2K 5% 2 R0201

APIO4_VDD

C1502 100nF
X5R 16V

Close Pin AC9

APIO4_VDDPST

C1501 100nF
C0201 X5R 16V
R1514 10K 5% R0201

Close Pin AC8

For RK809 codec

SARADC

U1000Q

SARADC 1.8V only

ADC_IN0 W27 << ADC0
ADC_IN1 Y29 << ADC1
ADC_IN2 Y28 << ADC2_KEY_IN
ADC_IN3 Y27 << ADC3_HP_HOOK
ADC_IN4 AA28 << ADC4
ADC_IN5 AA27 << ADC5_BOARD_ID
ADC_AVDD AA24

RK3399PRO

VCC_1V8_S3

C1505 100nF
C0201 X5R 16V

VCC_1V8_S3

R1508 10K 5% R0201

ADC0

R1509 DNP R0402

ADC1

R1577 10K 5% R0201

R1588 DNP R0402

VCC_1V8_S3

VCC_1V8_S3

Vboard_id=1.8V, Version:V10;
Vboard_id=0.9V, Version:V20;
Vboard_id=0V, Version:V30;

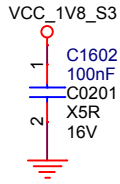
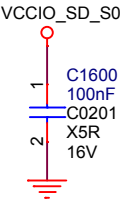
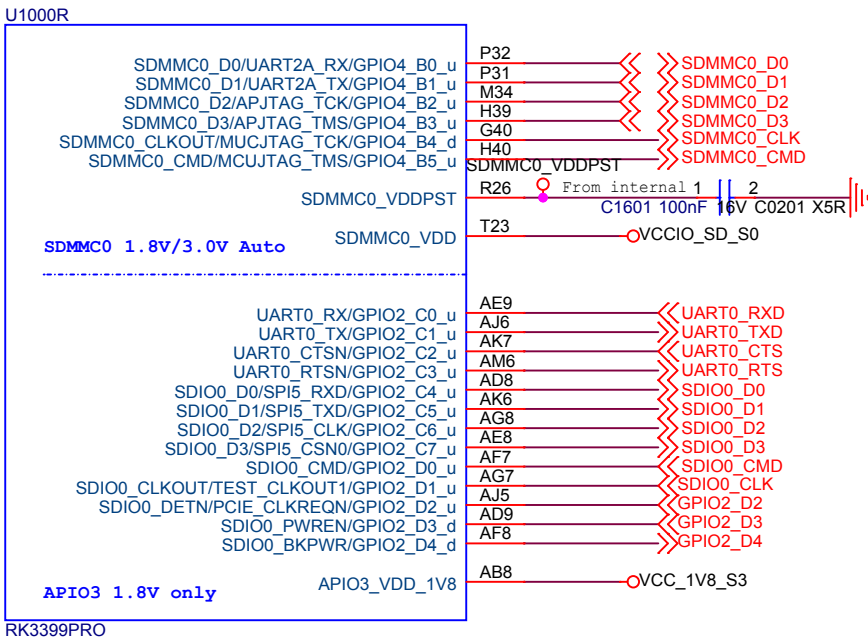
ADC5_BOARD_ID R1512 1 5% 100K R0201
R1513 1 5% 100K R0201
C1507 100nF X5R 16V 10% C0201



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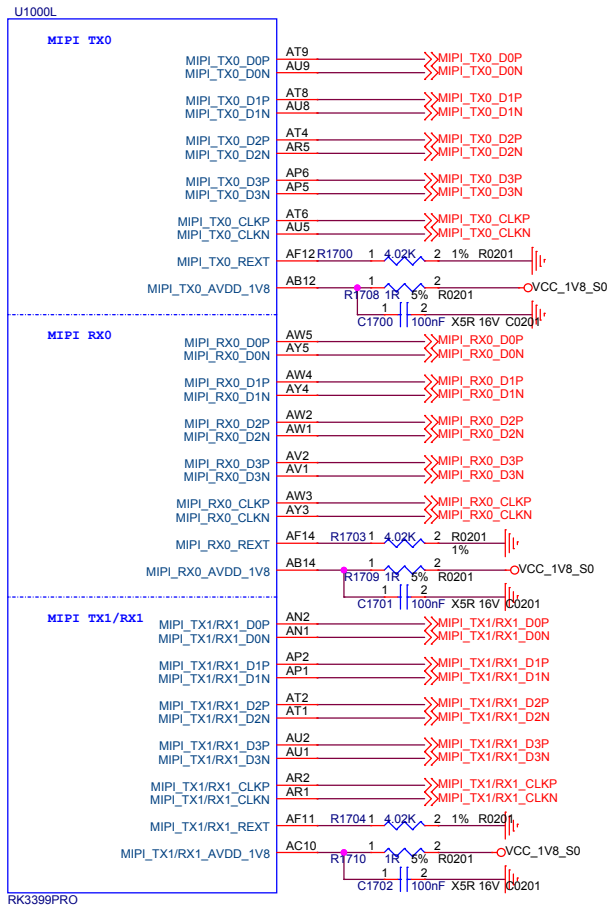
项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	11.RK3399 Pro SARADC/GPIO		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	11 of 22

SDMMC0/SDIO0 Controller

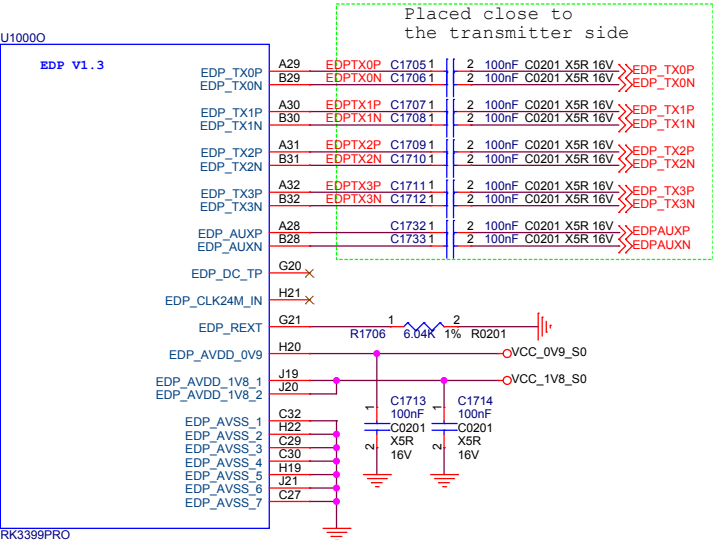


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项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	12.RK3399 Pro SDMMC0/SDMMC1		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	12 of 22

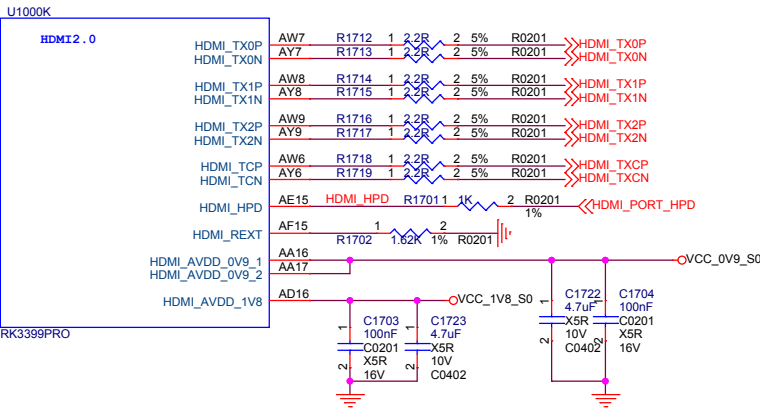
MIPI CSI/DSI



EDP

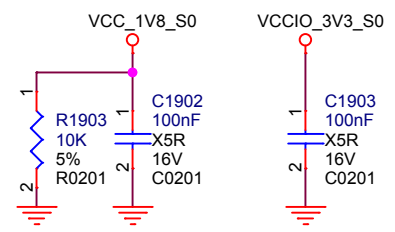
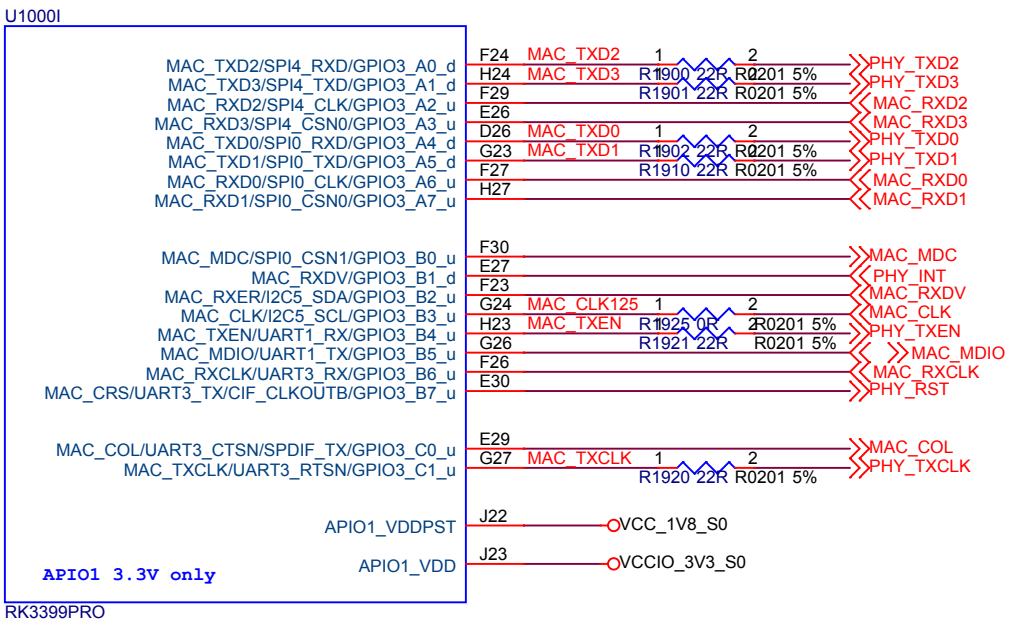


HDMI

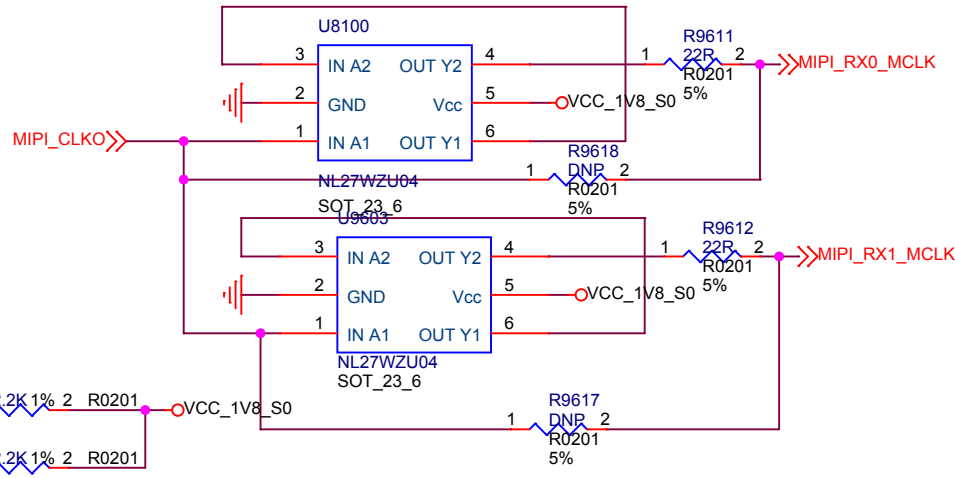
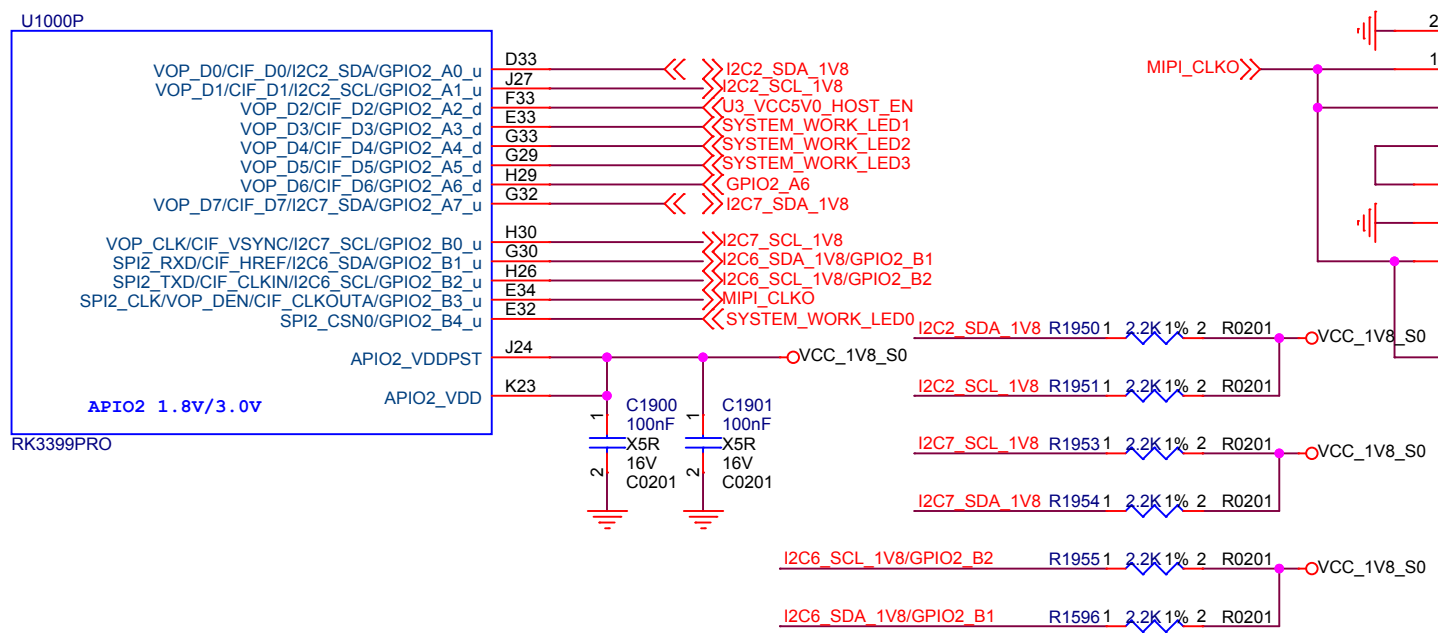



项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	13.RK3399 Pro Display		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	13of 22

MAC



VOP/CIF

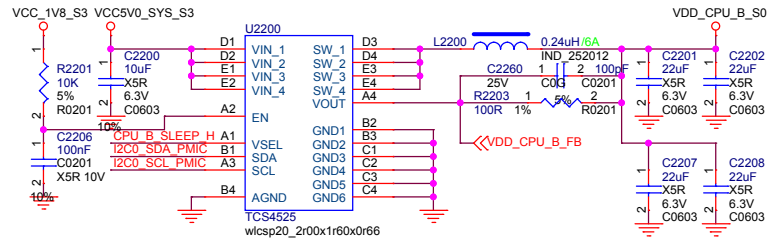




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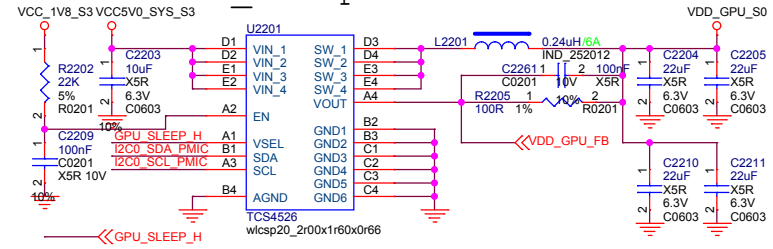
项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	14.RK3399 Pro RGMII/VOP/CIF		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	14 of 22

VDD_CPU_B power

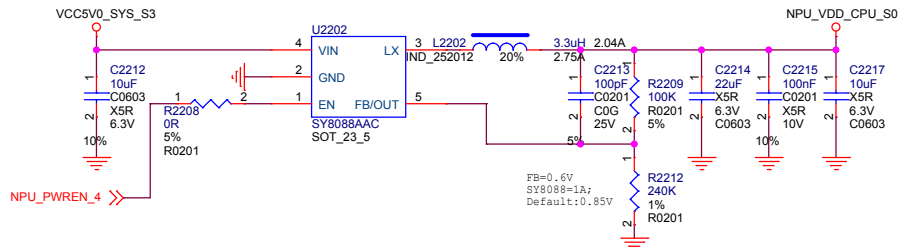
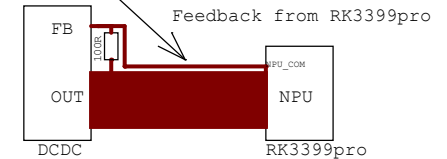
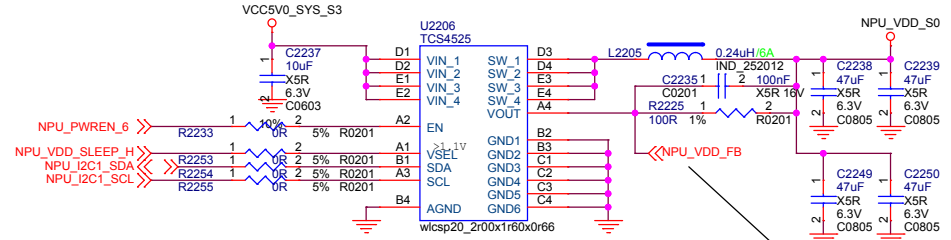
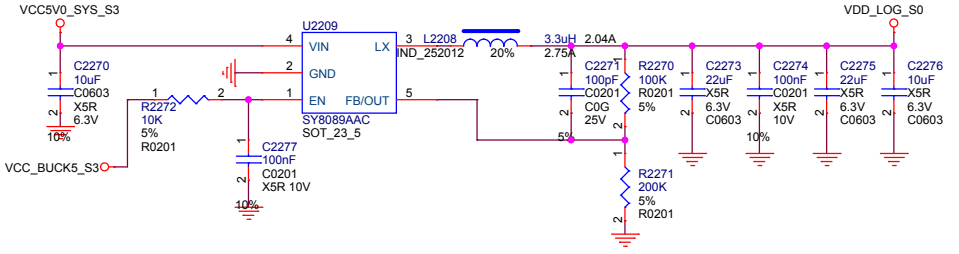
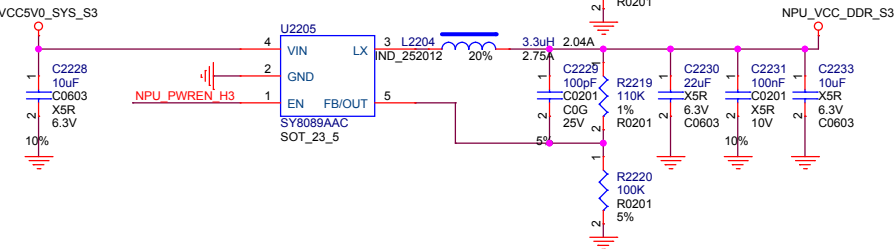
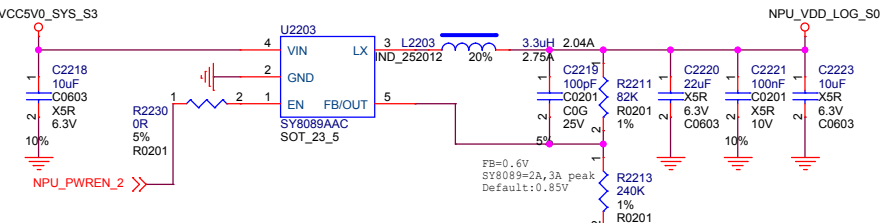
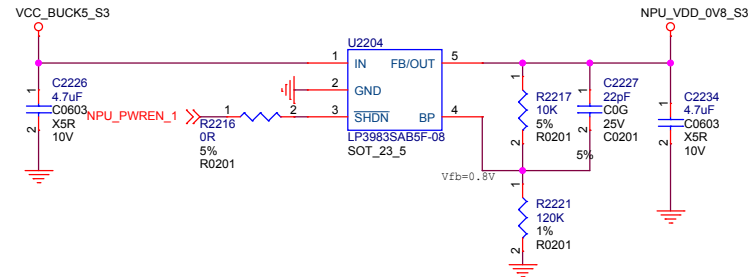
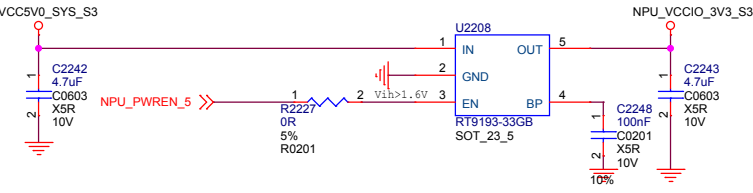
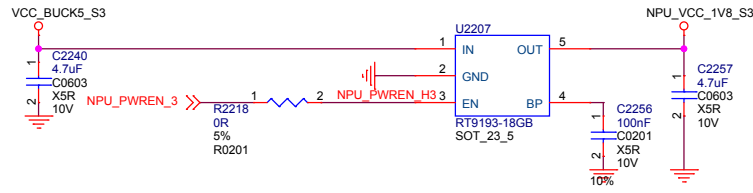


≡ CPU_B_SLEEP_H
≡ I2C0_SDA_PMIC
≡ I2C0_SCL_PMIC


VDD_GPU power



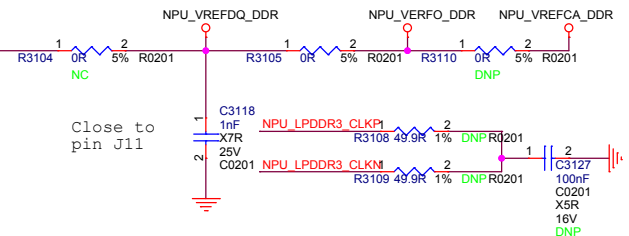
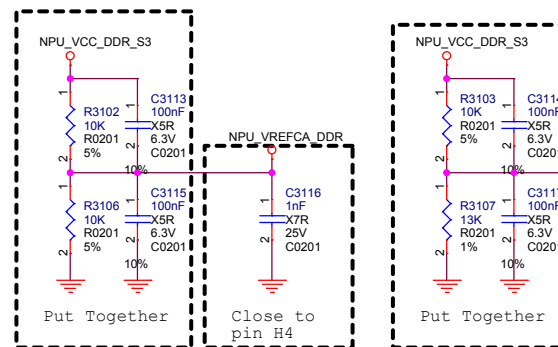
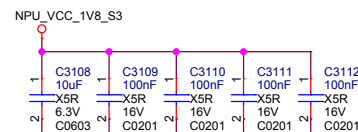
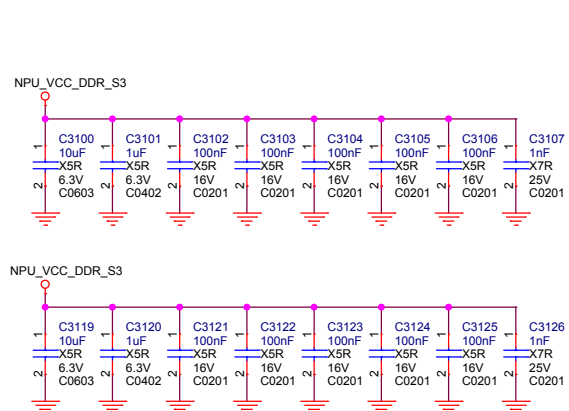
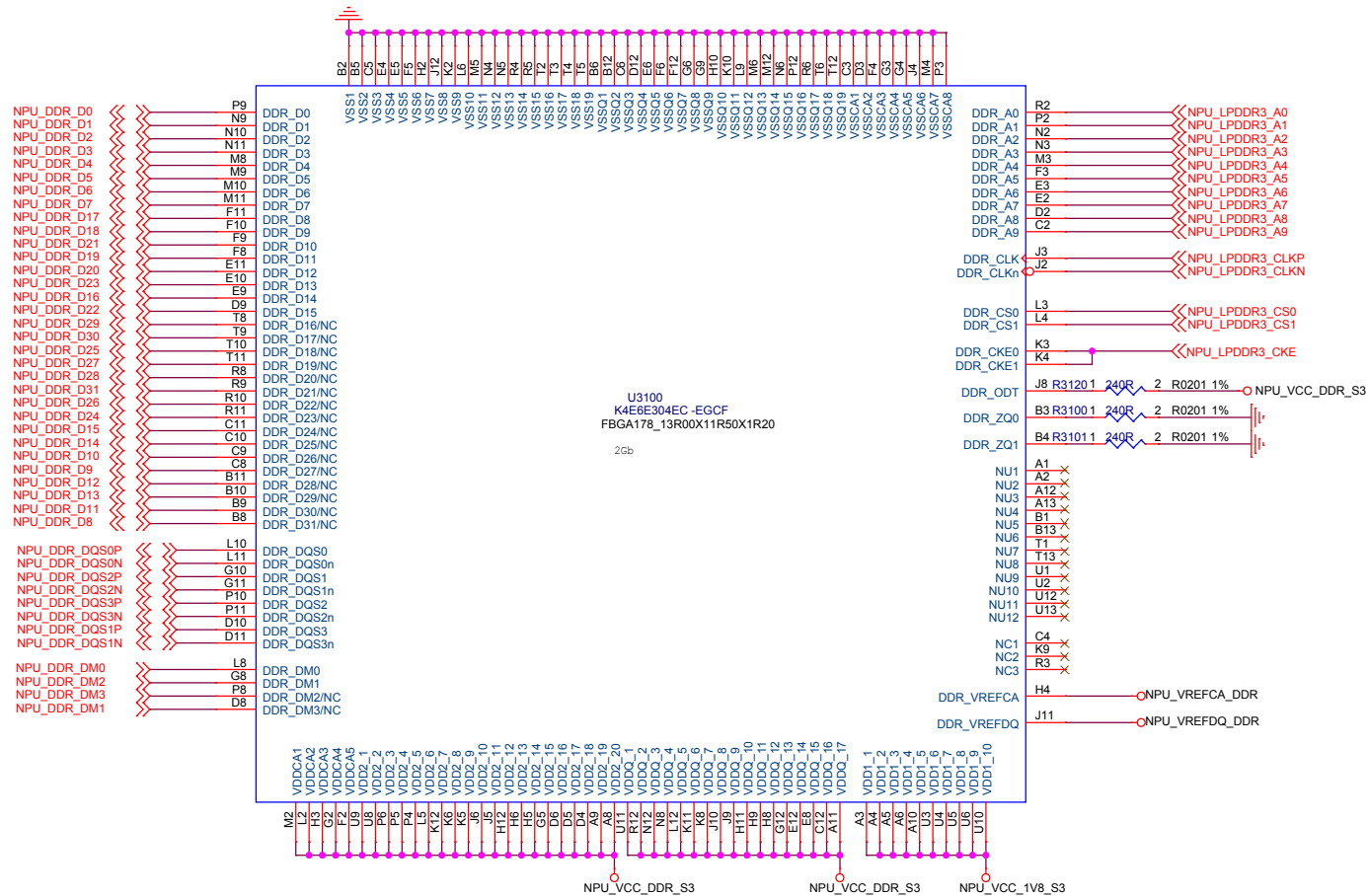
≡ GPU_SLEEP_H



NPU Part power

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项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	16.POWER-CPU/GPU/NPU		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	16 of 22

NPU LPDDR3 1x32bit

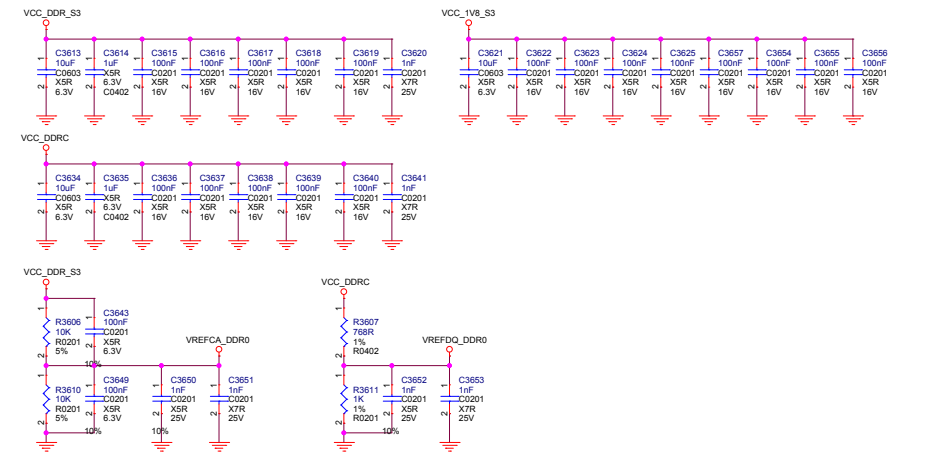
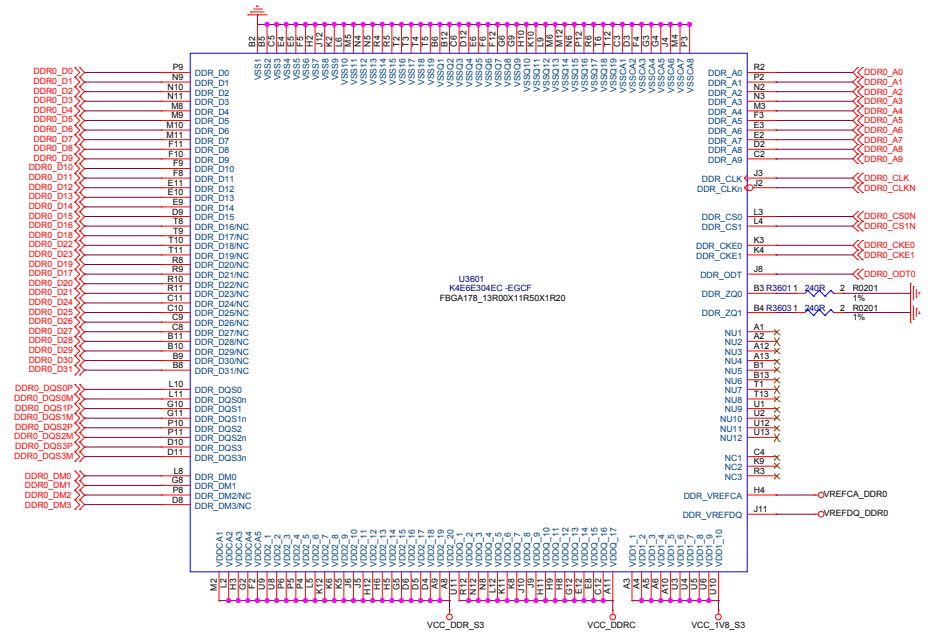
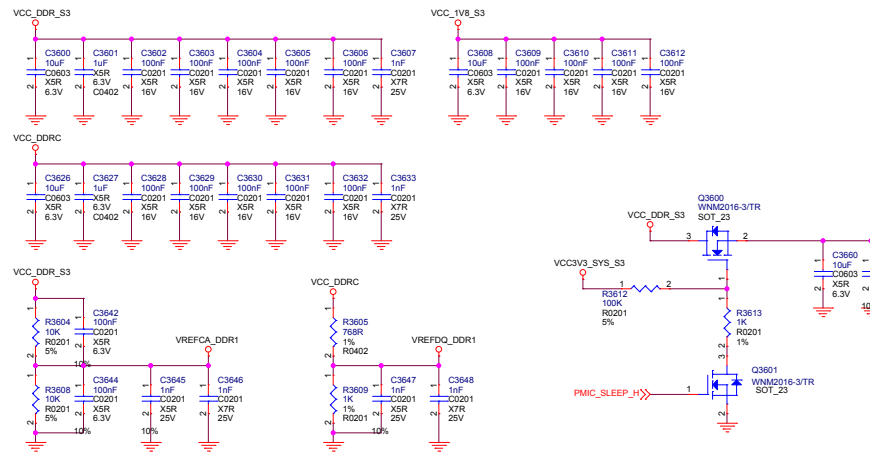
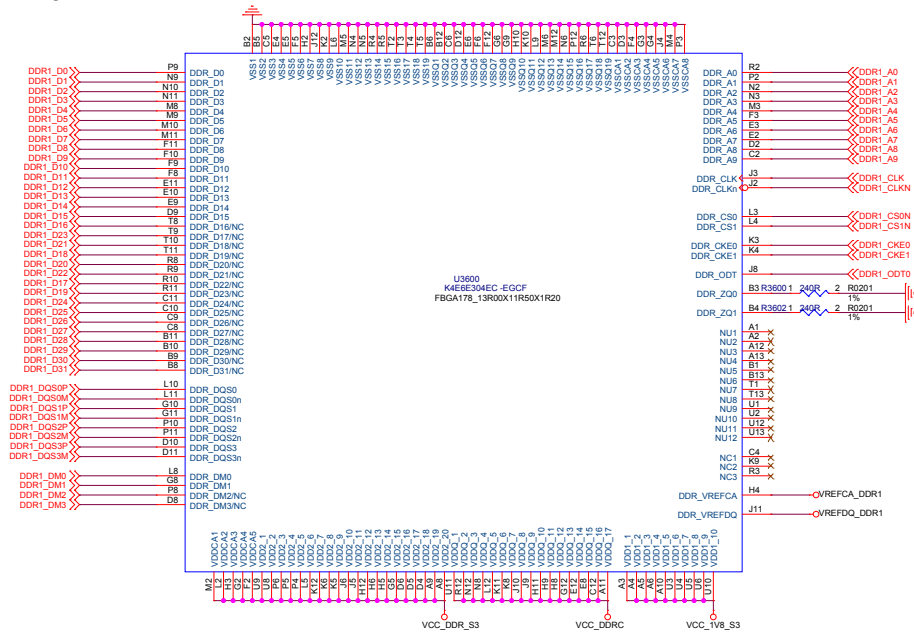


Note: All the power filter capacitors should be placed close to the power pins of LPDDR3

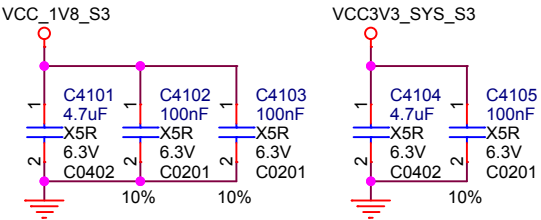
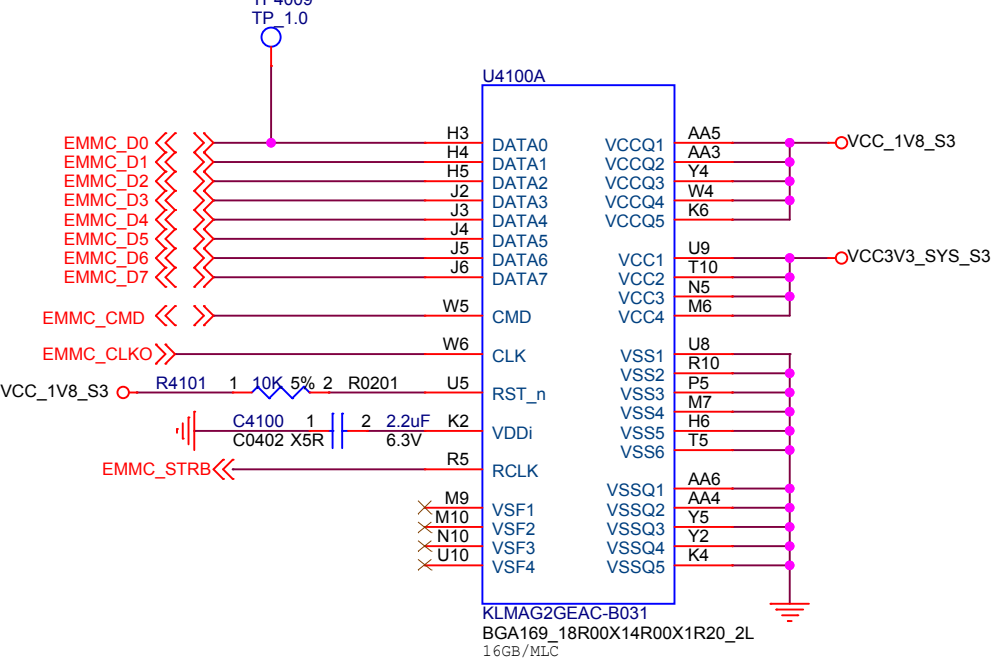
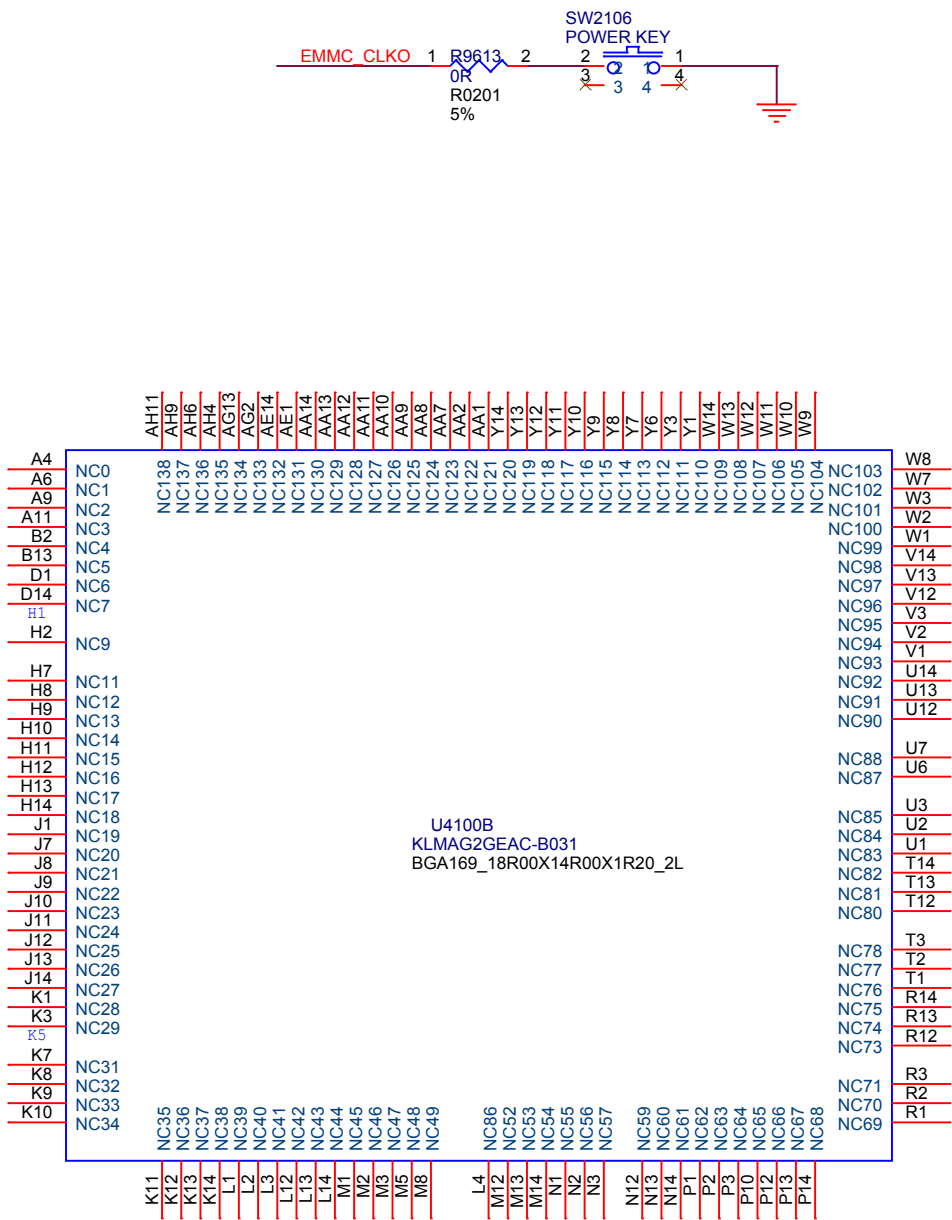
Note:
 $V_{ih} = V_{CC}$
 $V_{il} = V_{CC} \cdot R_{on} / (R_{on} + R_{odt})$
 $V_{REFDQ_DDR} = (V_{ih} + V_{il}) / 2$


eg: $V_{CC}=1.2V$, $R_{on}=34\Omega$, $R_{odt}=240\Omega$
so, $V_{ih}=1.2V$, $V_{il}=0.149V$, $V_{REFDQ_DDR}=0.674V$

LPDDR3

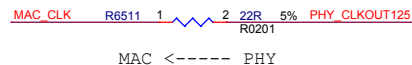
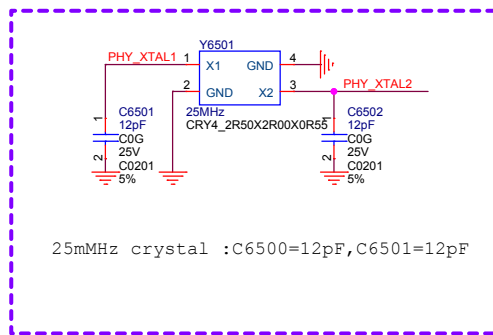


eMMC

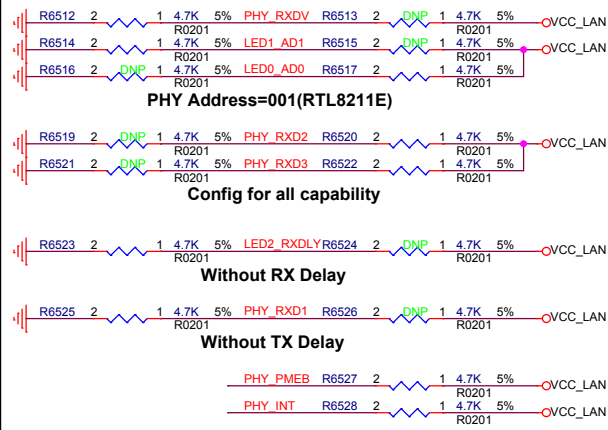
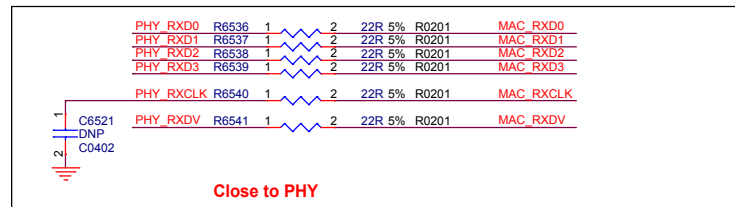
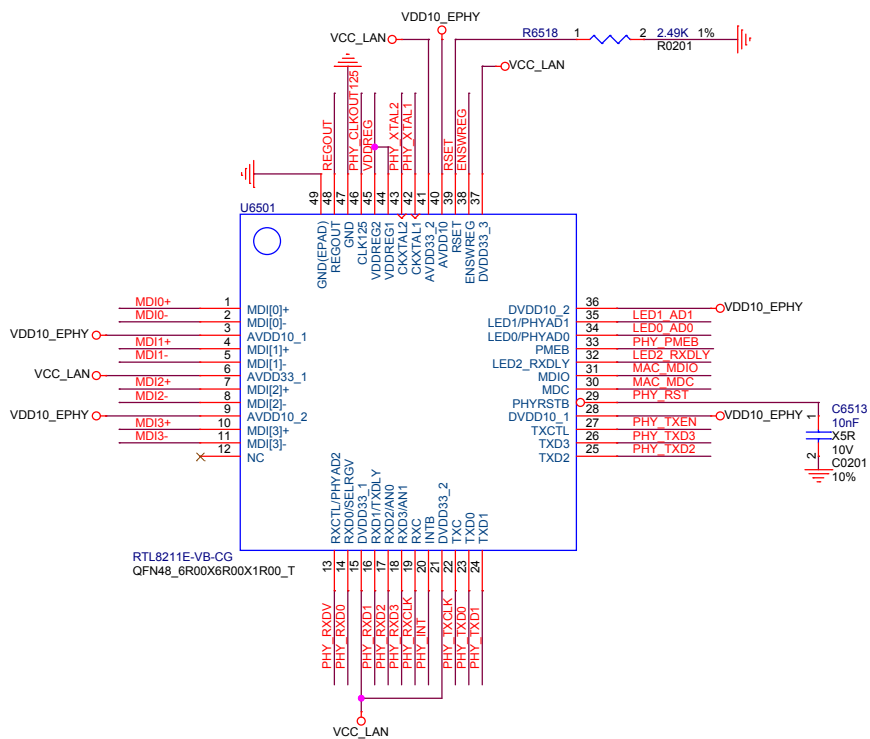


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项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	19.EMMC		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	19 of 22

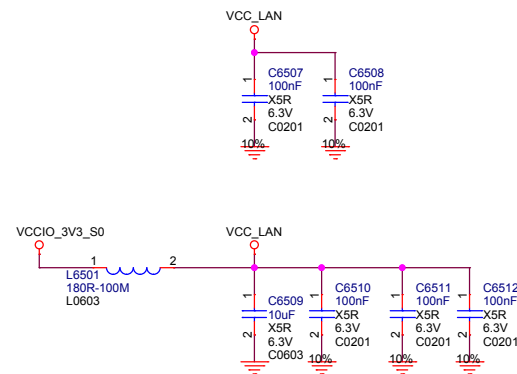
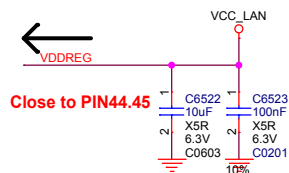
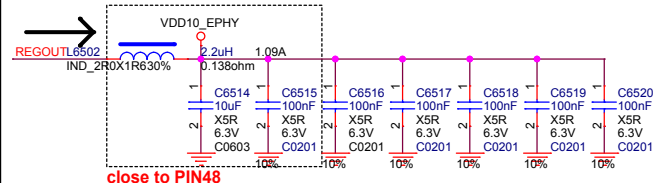
PHY_TXD0
PHY_TXD1
PHY_TXD2
PHY_TXD3
PHY_TXEN
PHY_TXCLK
MAC_RXD0
MAC_RXD1
MAC_RXD2
MAC_RXD3
MAC_RXDV
MAC_RXCLK
MAC_CLK
MAC_MDIO
MAC_MDC
PHY_RST
PHY_INT
PHY_PMEB



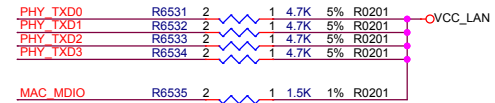
MDIO+ <--> LAN_MDIO+
MDIO- <--> LAN_MDIO-
MDI1+ <--> LAN_MDI1+
MDI1- <--> LAN_MDI1-
MDI2+ <--> LAN_MDI2+
MDI2- <--> LAN_MDI2-
MDI3+ <--> LAN_MDI3+
MDI3- <--> LAN_MDI3-
LED2_RXDLY <--> LED2_RXDLY
LED1_AD1 <--> LED1_AD1
LED0_AD0 <--> LED0_AD0



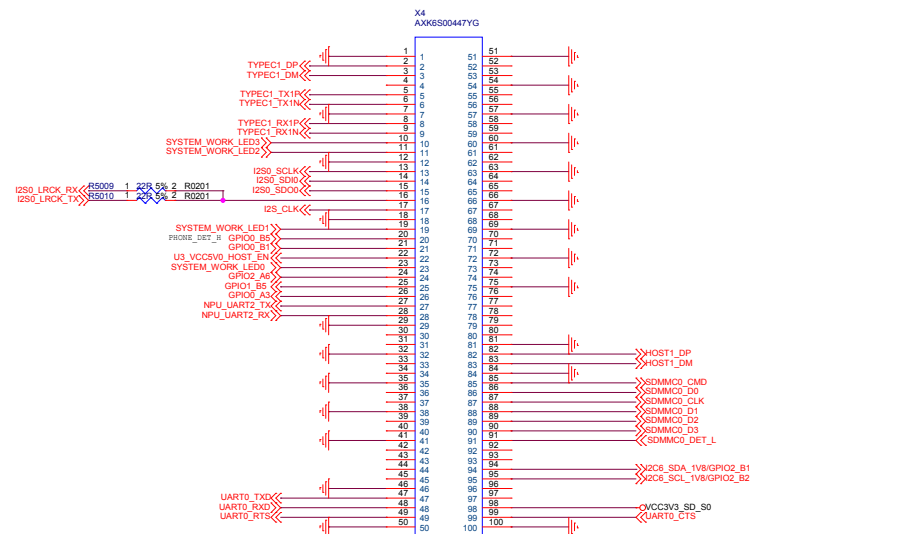
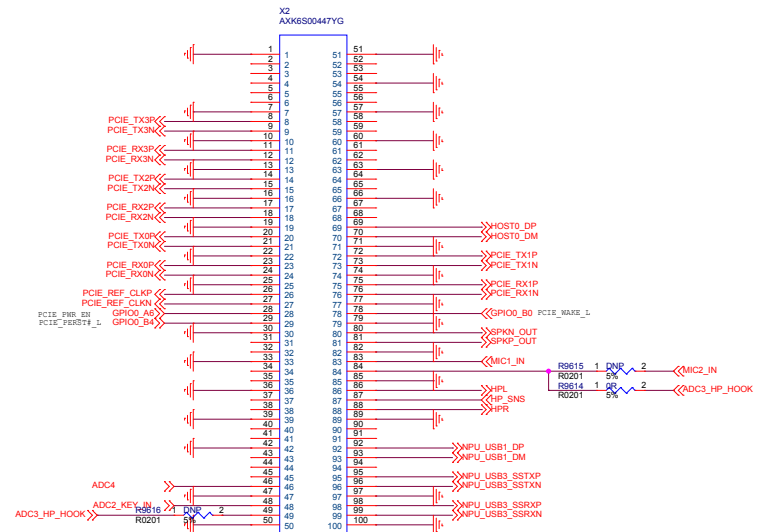
Connect ENSWREG to AVDD33 to enable Switching regulator or connect ENSWREG to GND to disable Switching regulator.



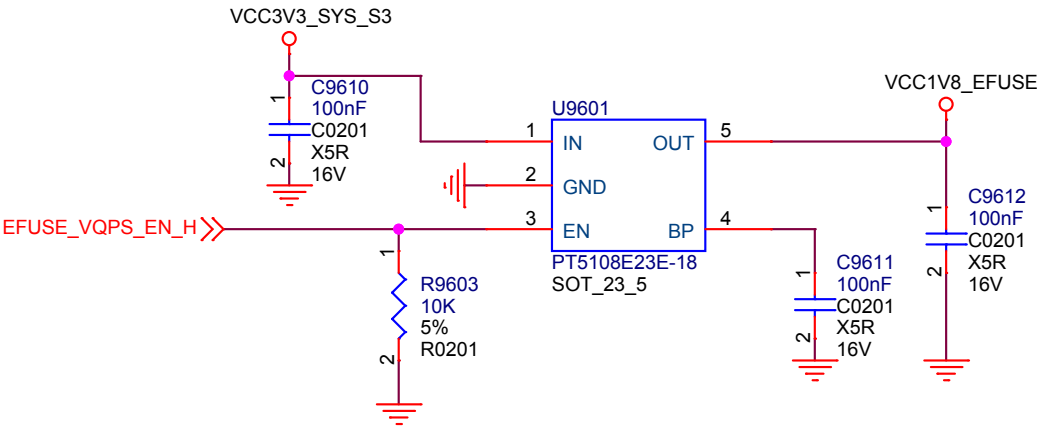
RGMII 1000M



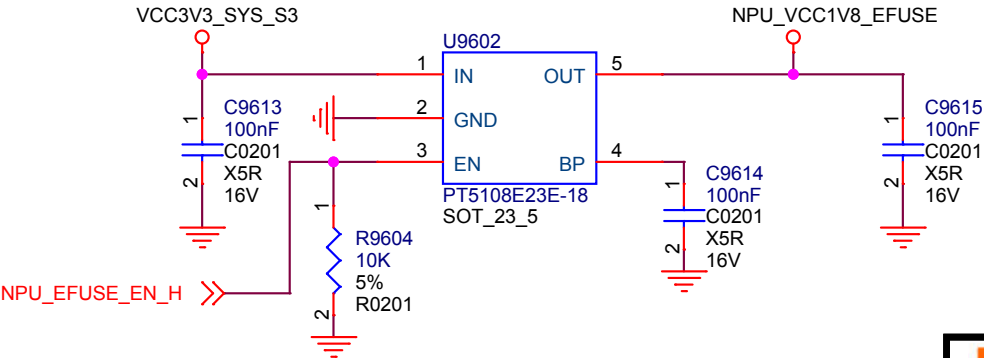
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项目:	SYSTEM ON MODULE BOARD			
文件:	RK3399Pro_SOM_SCH			
图纸:	20.RGMII-10/100/1000M			
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EFUSE POWER



NPU EFUSE POWER



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项目:	SYSTEM ON MODULE BOARD		
文件:	RK3399Pro_SOM_SCH		
图纸:	22.EFUSE		
修改日期:	Tuesday, June 04, 2019	版本:	V0.9
设计者:	zhang.chen	页码:	22 of 22