

野火 RK3588 LubanCat 5 原理图

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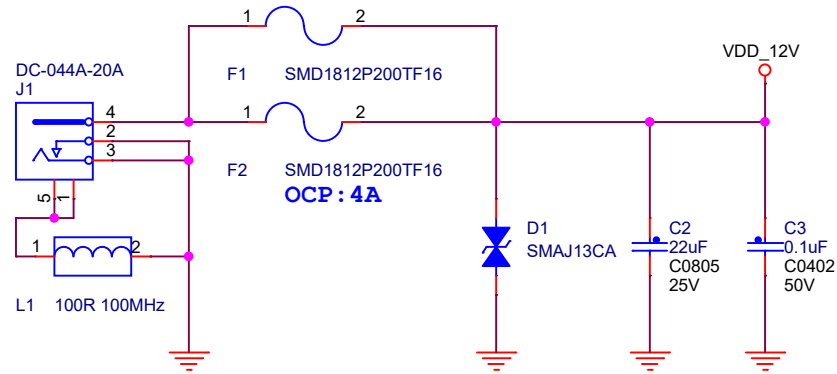
Historic Version

版本号	日期	设计	描述
V0.1	2023-02-09	ghs	初始版本, 开发阶段
V1.0	2023-11-10	ghs	正式版本
V1R0	2024-02-21	ghs	修正HDMI RX热拔插检测功能异常
V2R0	2024-04-10	ghs	调整U1, U2芯片的工作模式为PWM。 删除RTC_32K_IN信号, 将其引脚调整为FUSB302_INT信号 将LCD0_BL_PWM, LCD1_BL_PWM的引脚变更为GPIO0_C4, GPIO0_C6 将GPIO0_B7, GPIO0_C0的引脚变更为CAN0_TX_M0, CAN0_RX_M0 将GPIO4_B2, GPIO4_B3的引脚变更为CAN1_RX_M1, CAN1_TX_M1 将M2_E_KEY_nWDISABLE的引脚变更为I/O拓展芯片的GPIO6_A0 将EDP_BL_EN的引脚变更为I/O拓展芯片的GPIO6_A1 调整I/O拓展芯片的引脚及编号 调整40PIN排针接口, 使其兼容CAN接口。

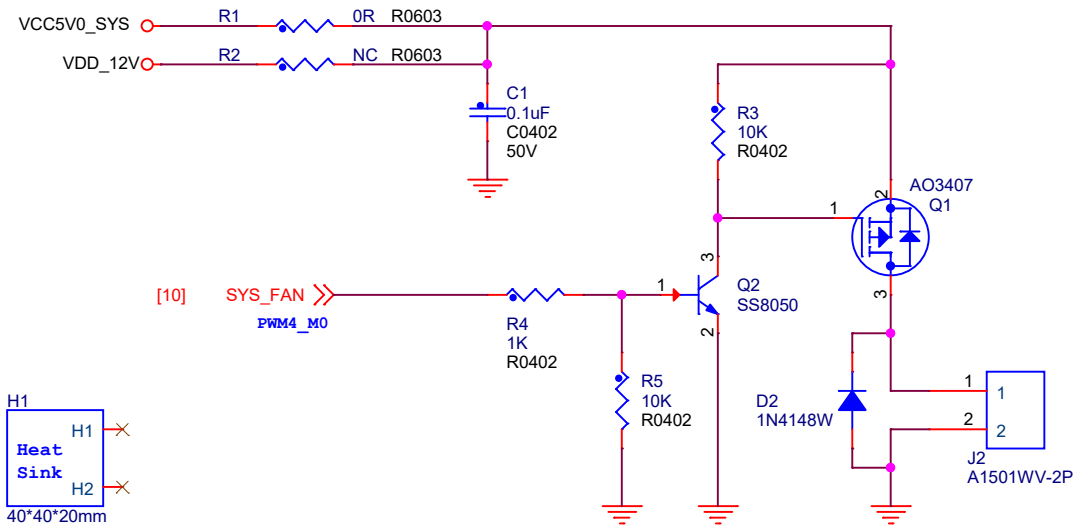
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DC IN

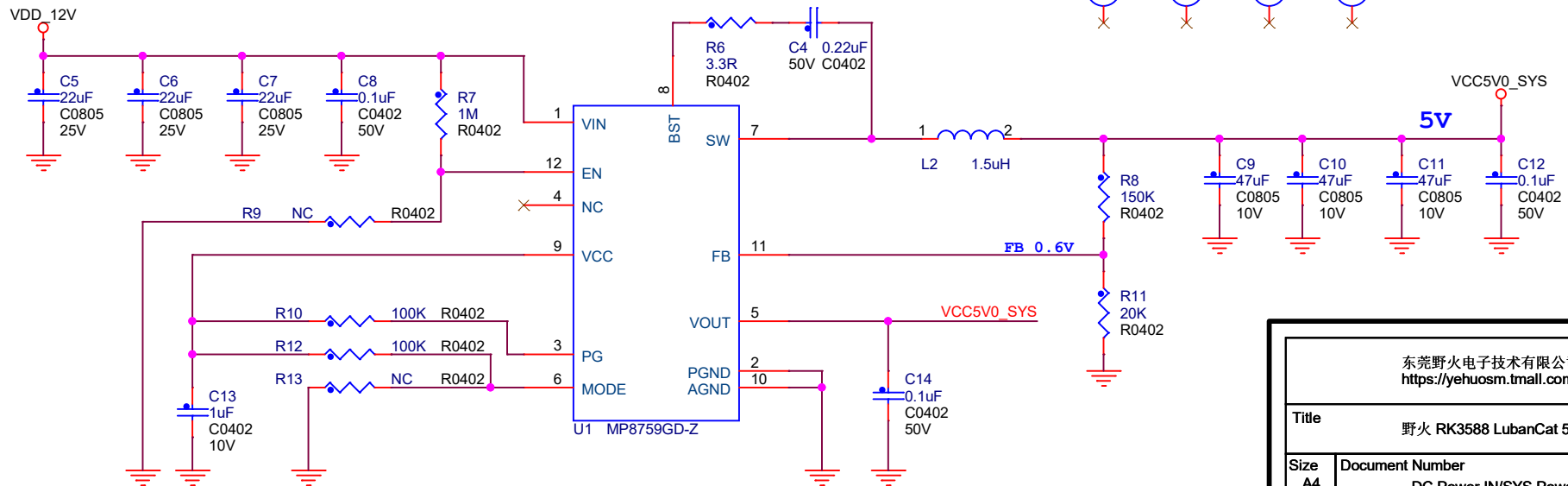
12V 3A



Active Cooling



VCC5V_SYS



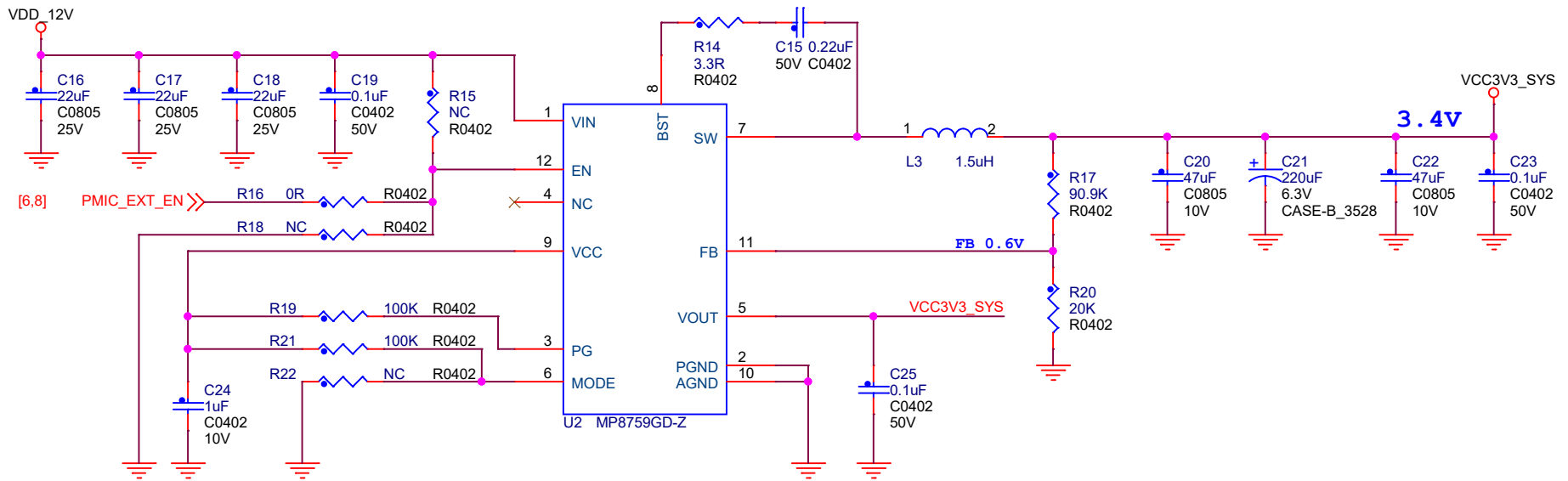
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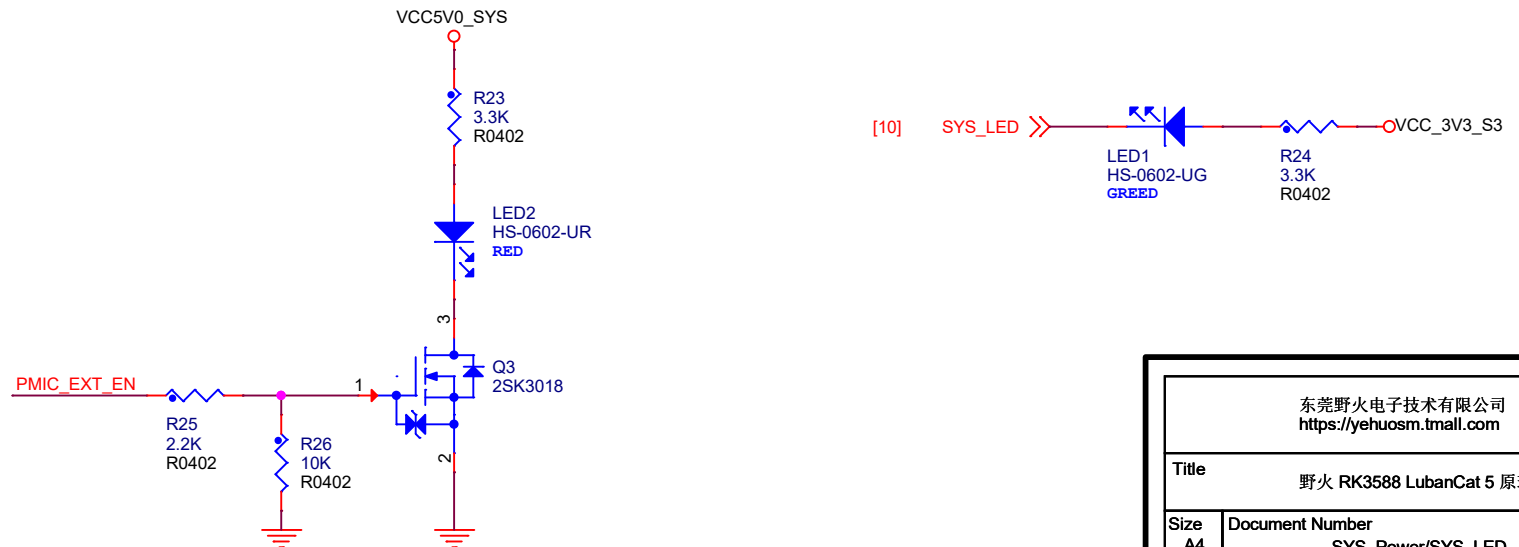
Size A4	Document Number DC Power IN/SYS Power/FAN	Rev V2R0
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VCC3V3_SYS



Power_LED/SYS_LED



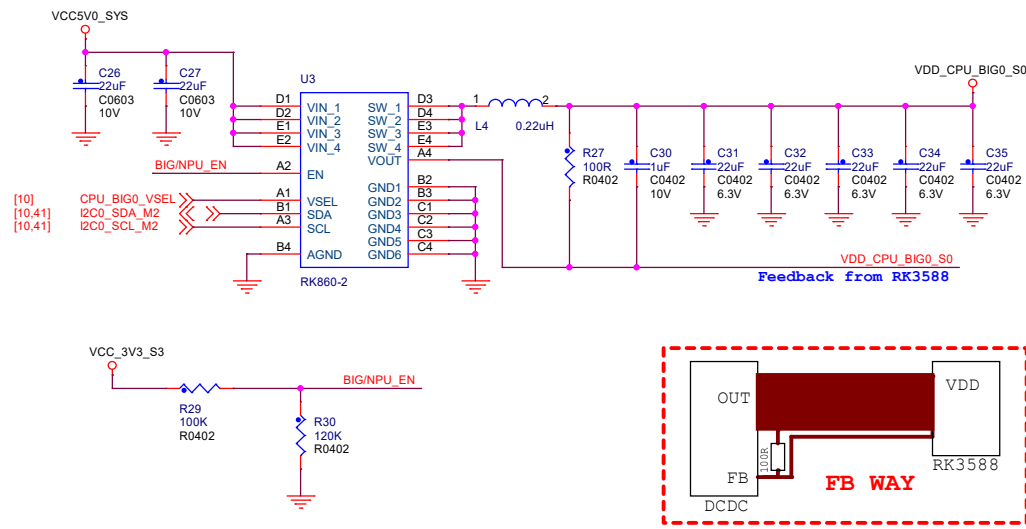
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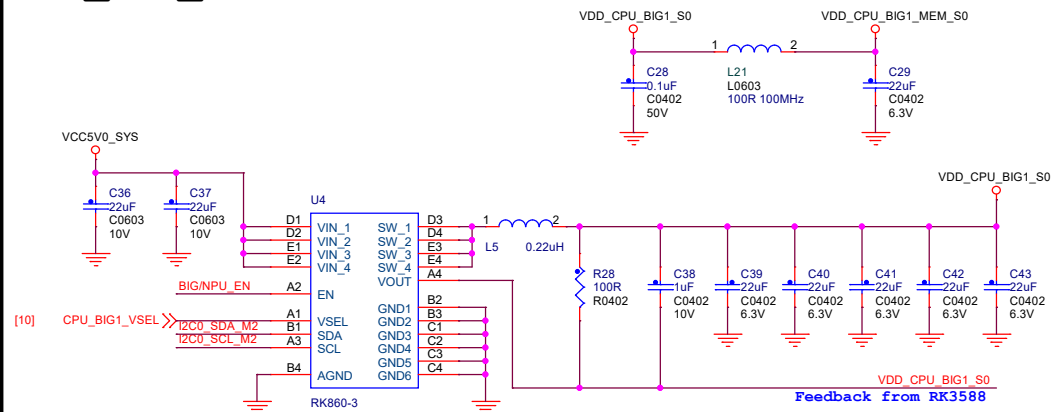
Size A4	Document Number SYS_Power/SYS_LED	Rev V2R0
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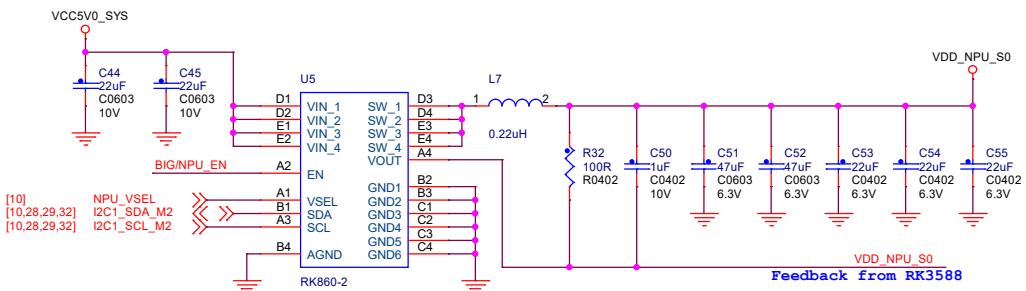
VDD_CPU_BIG0



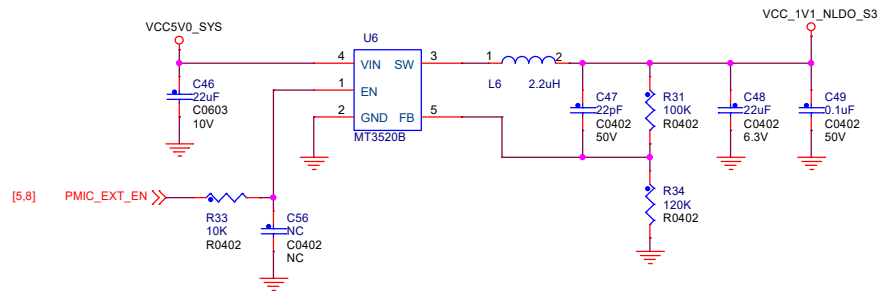
VDD_CPU_BIG1



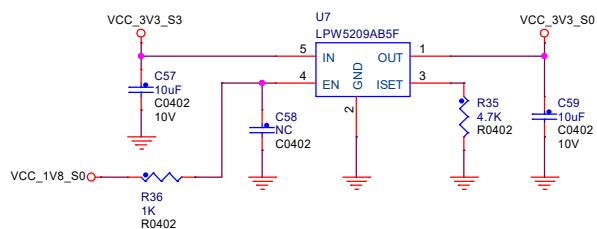
VDD_NPU



VCC_1V1_NLDO_S3

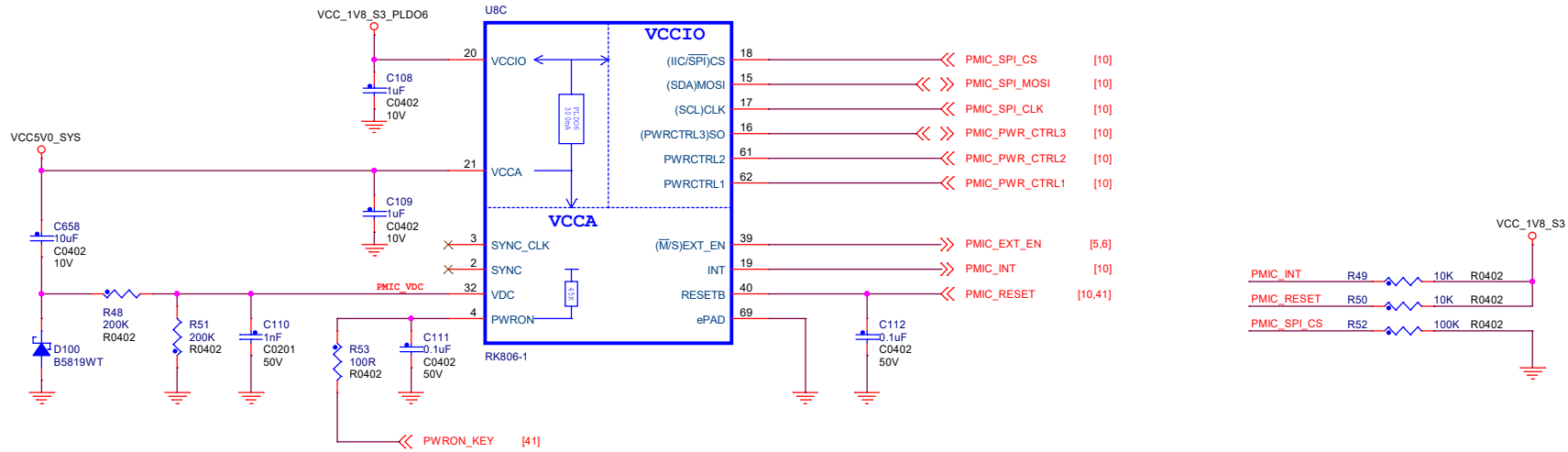


VCC_3V3_S0

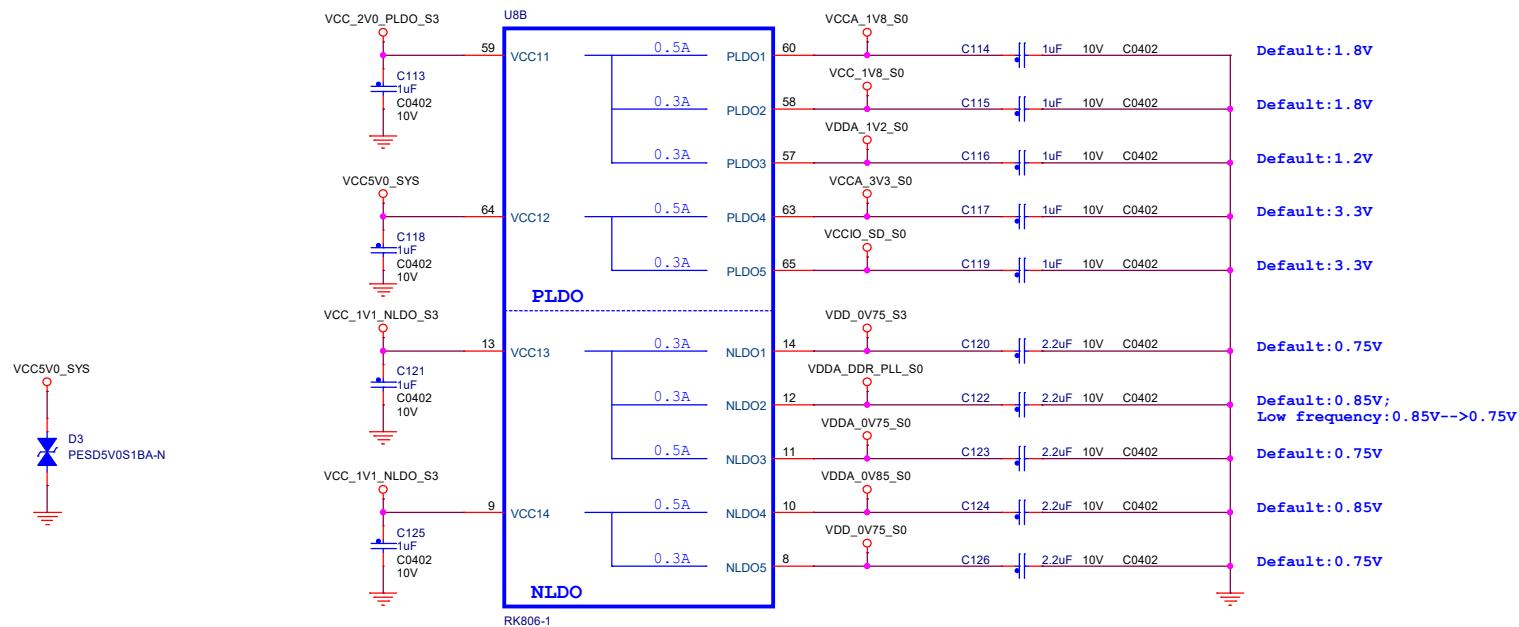


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PMIC RK806-1 Management

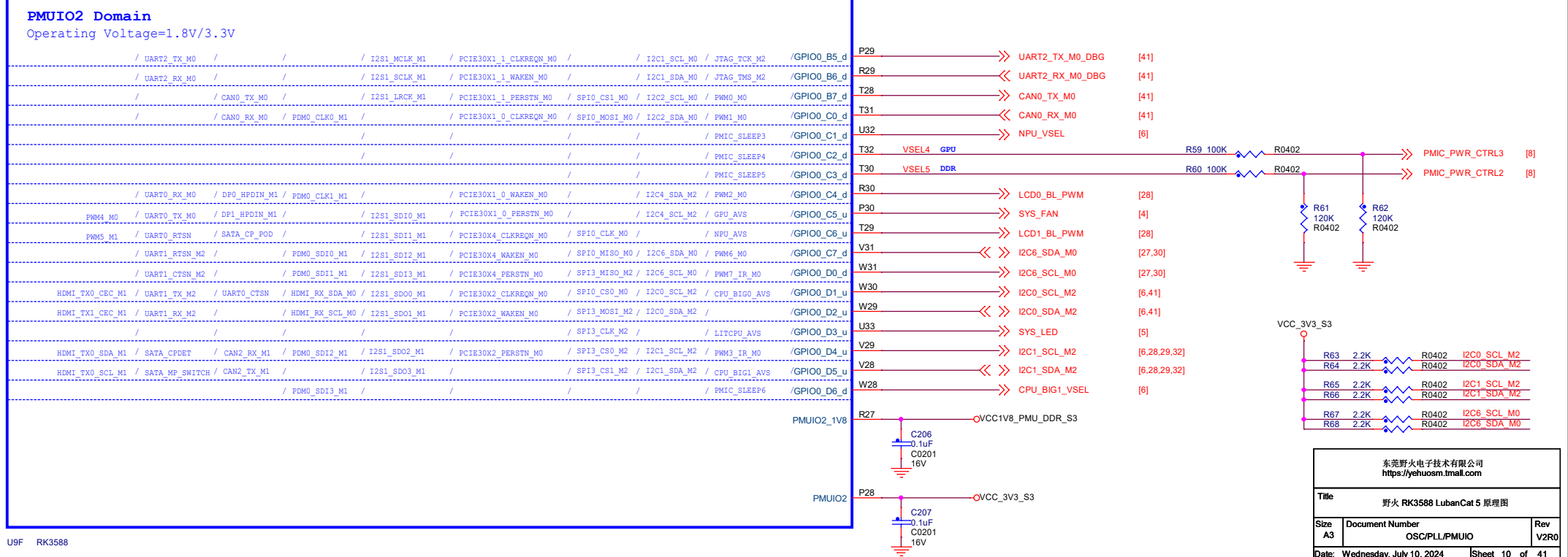
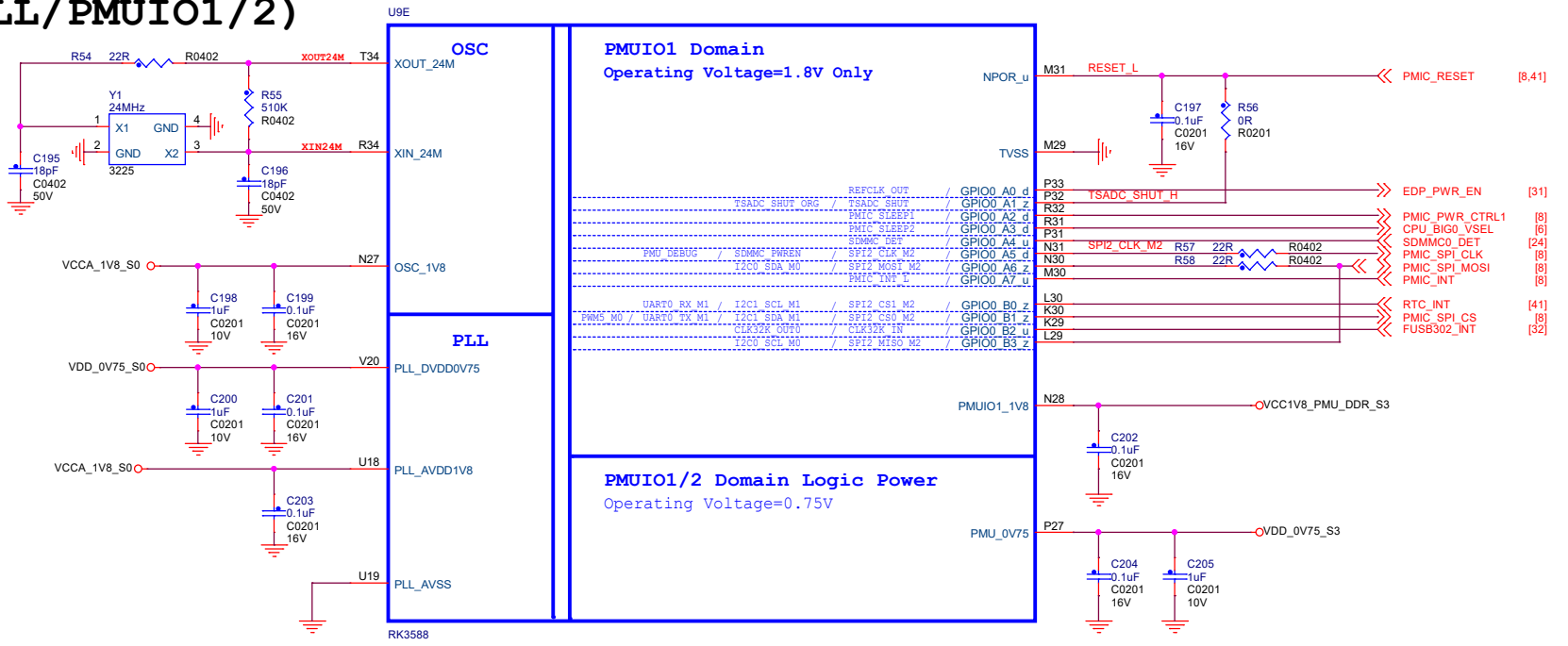


PMIC RK806-1 LDO



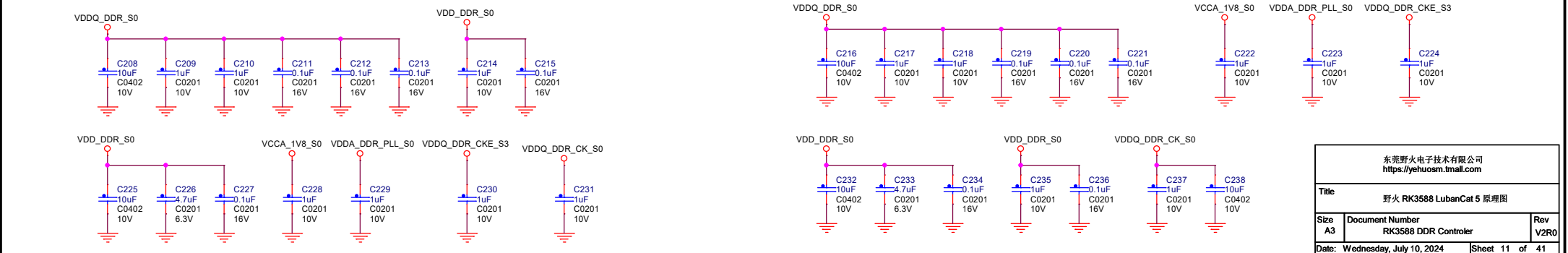
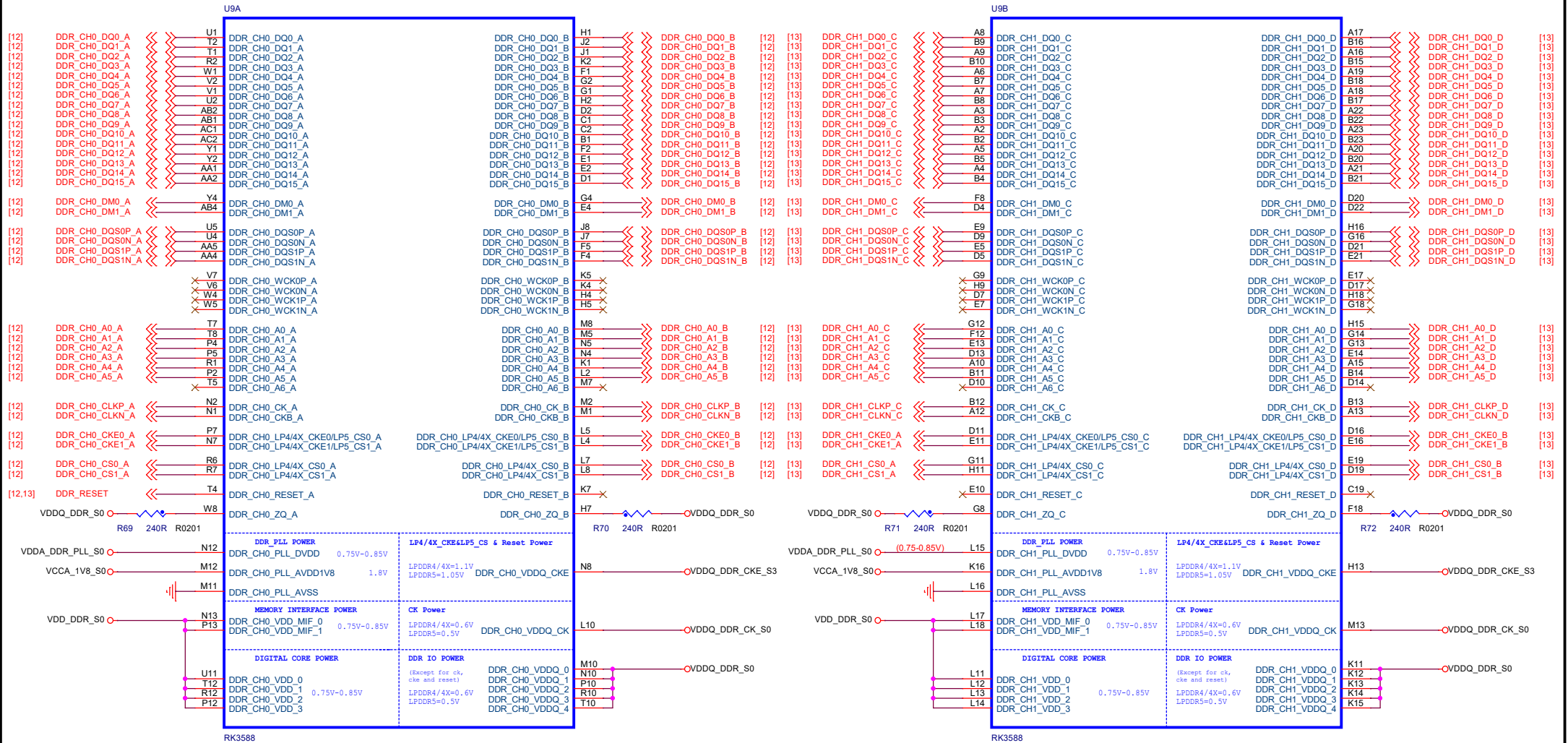
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RK3588_E (OSC/PLL/PMUIO1/2)



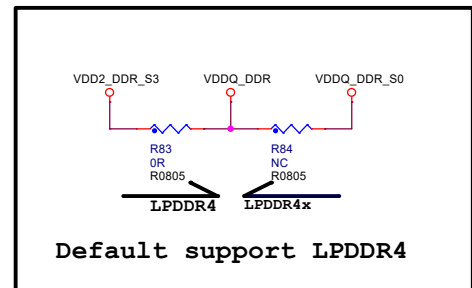
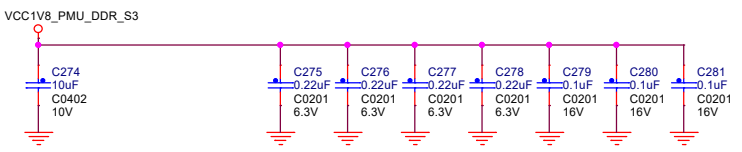
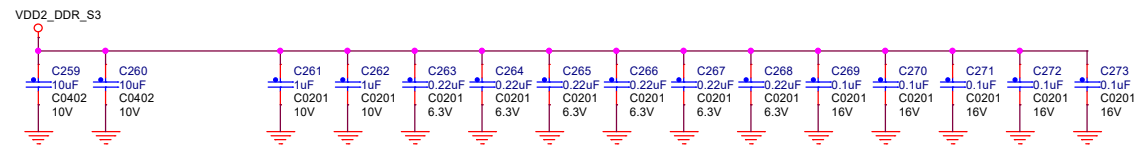
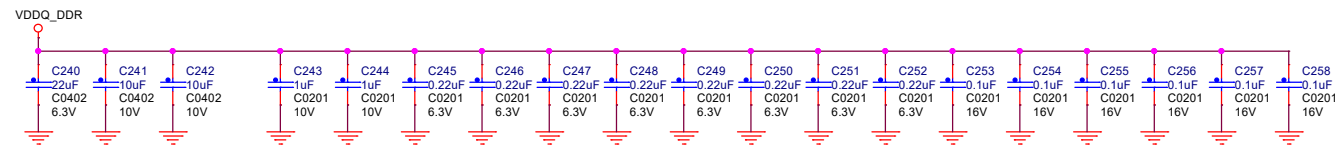
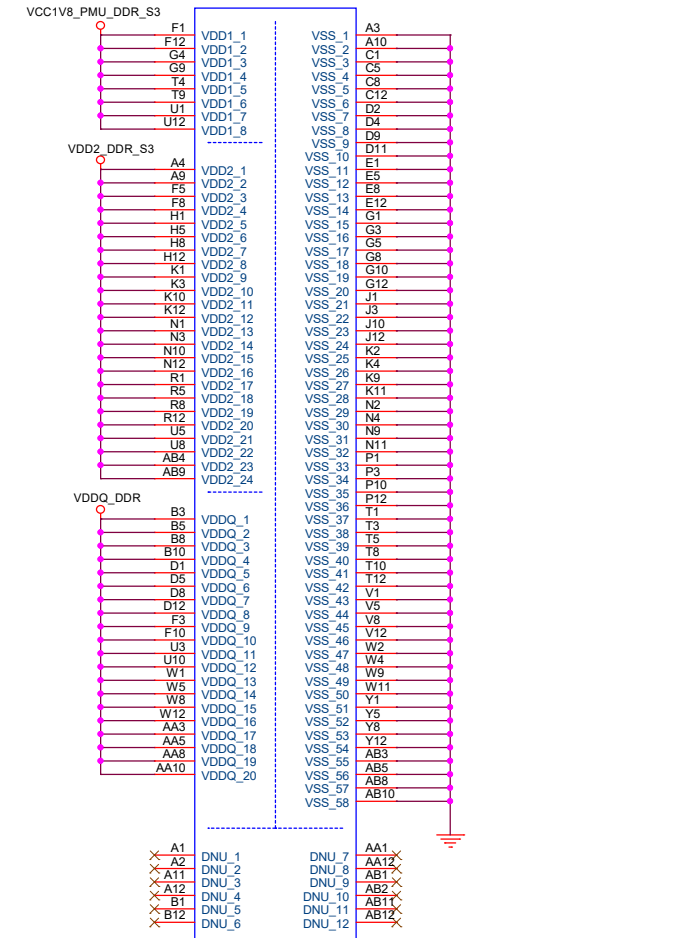
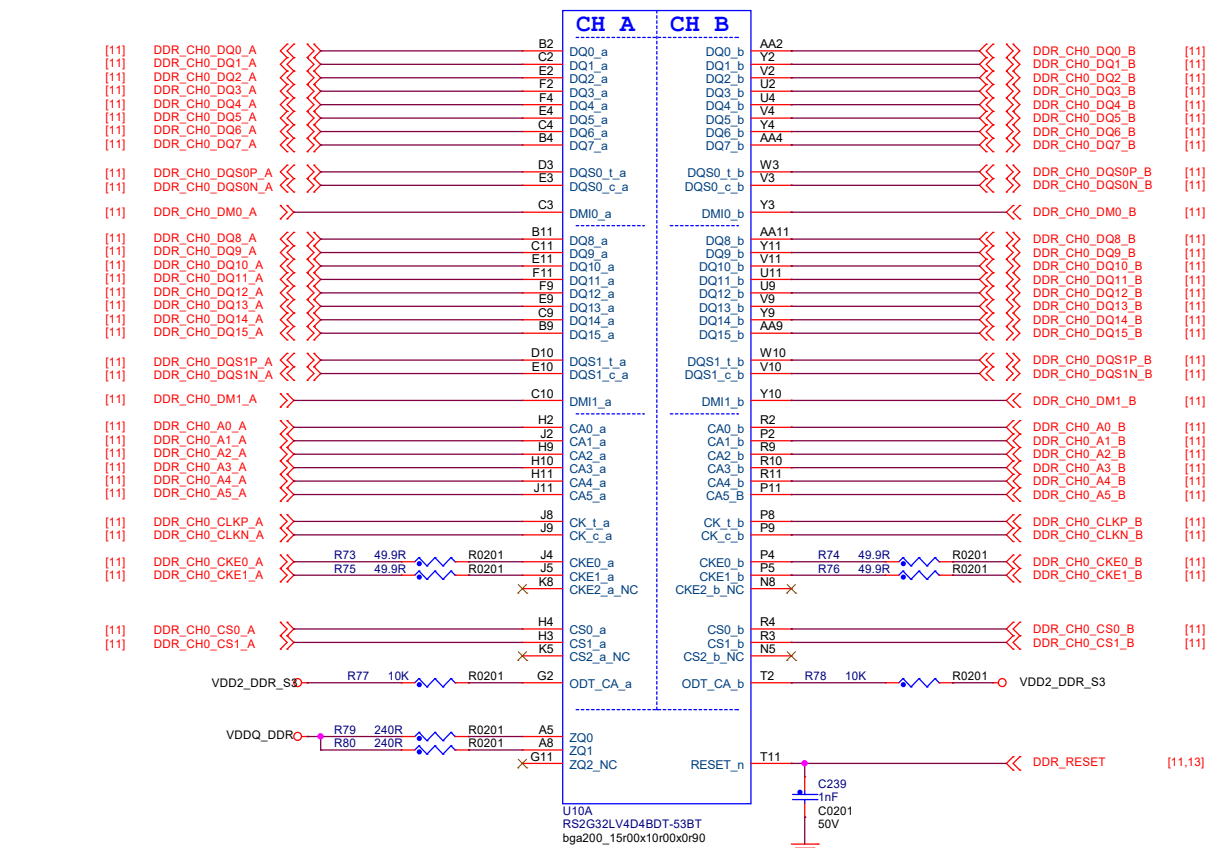
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RK3588 (DDR PHY)



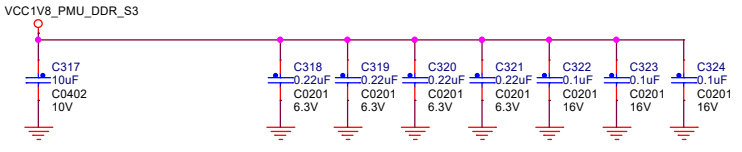
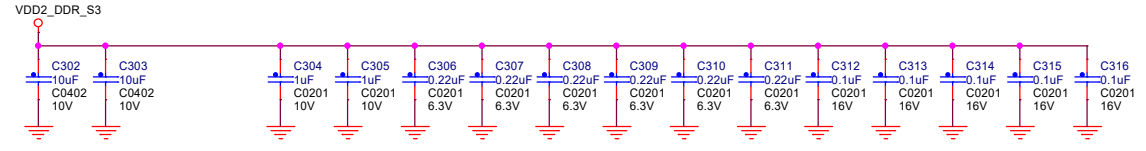
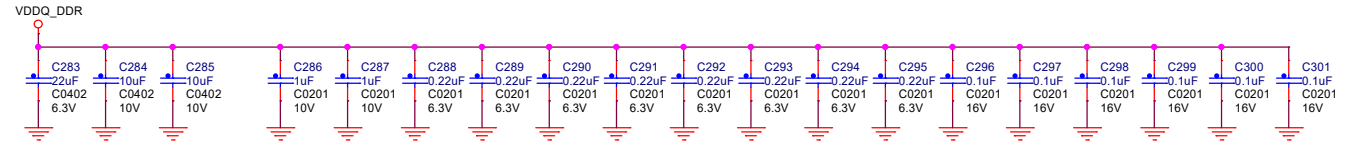
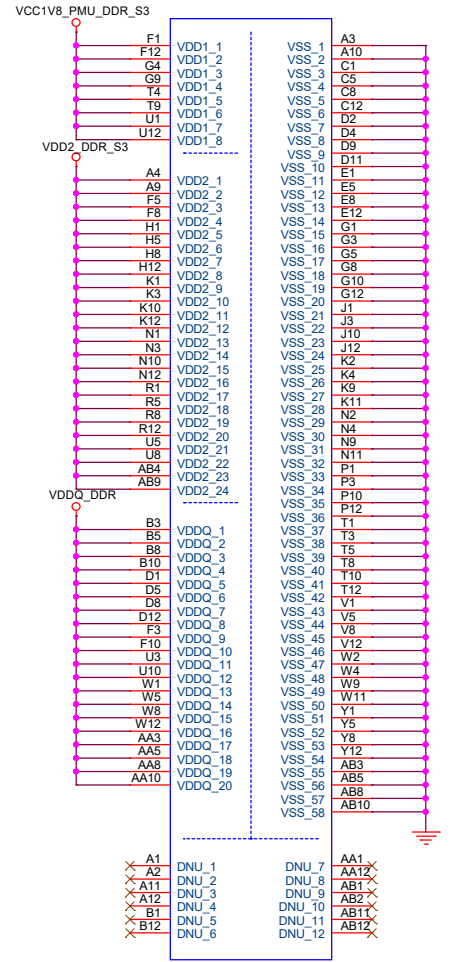
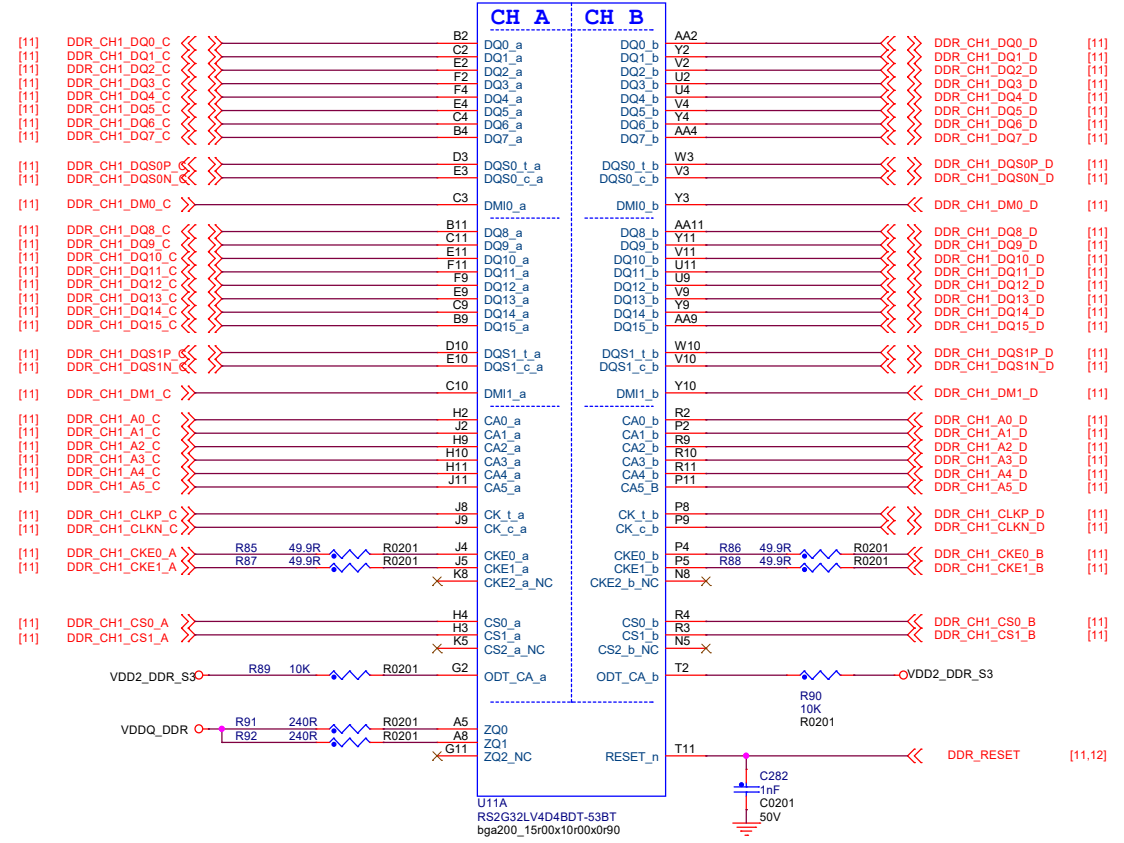
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A3	RK3588 DDR Controller	V2R0
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LPDDR4/4x_01



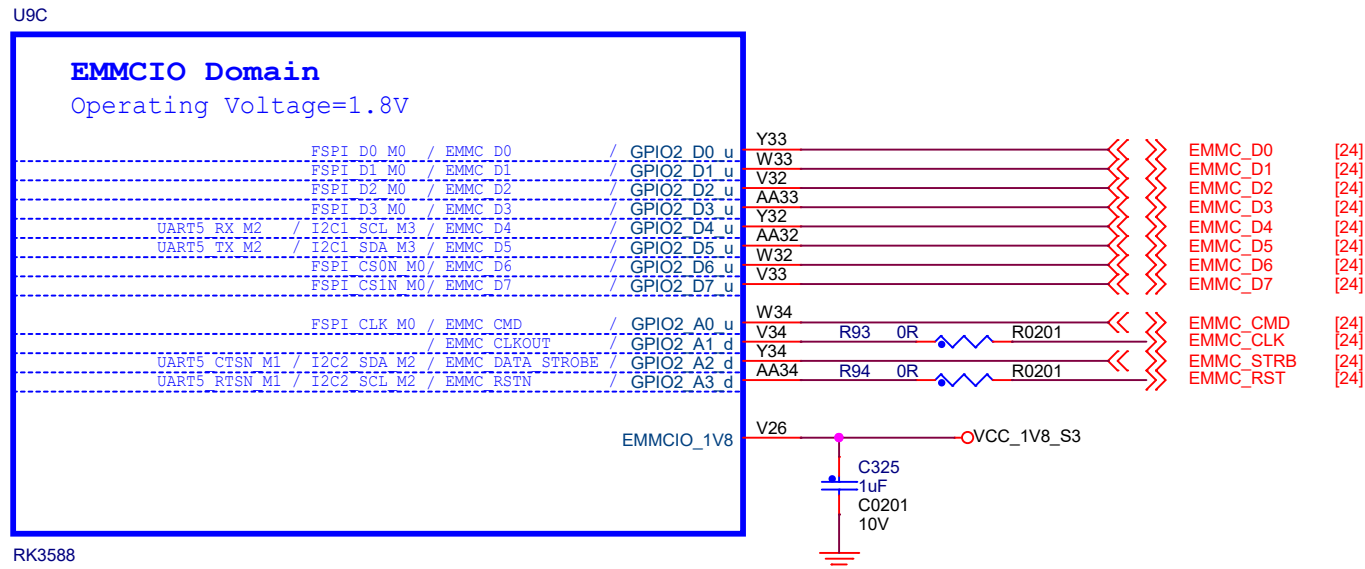
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LPDDR4/4x_02

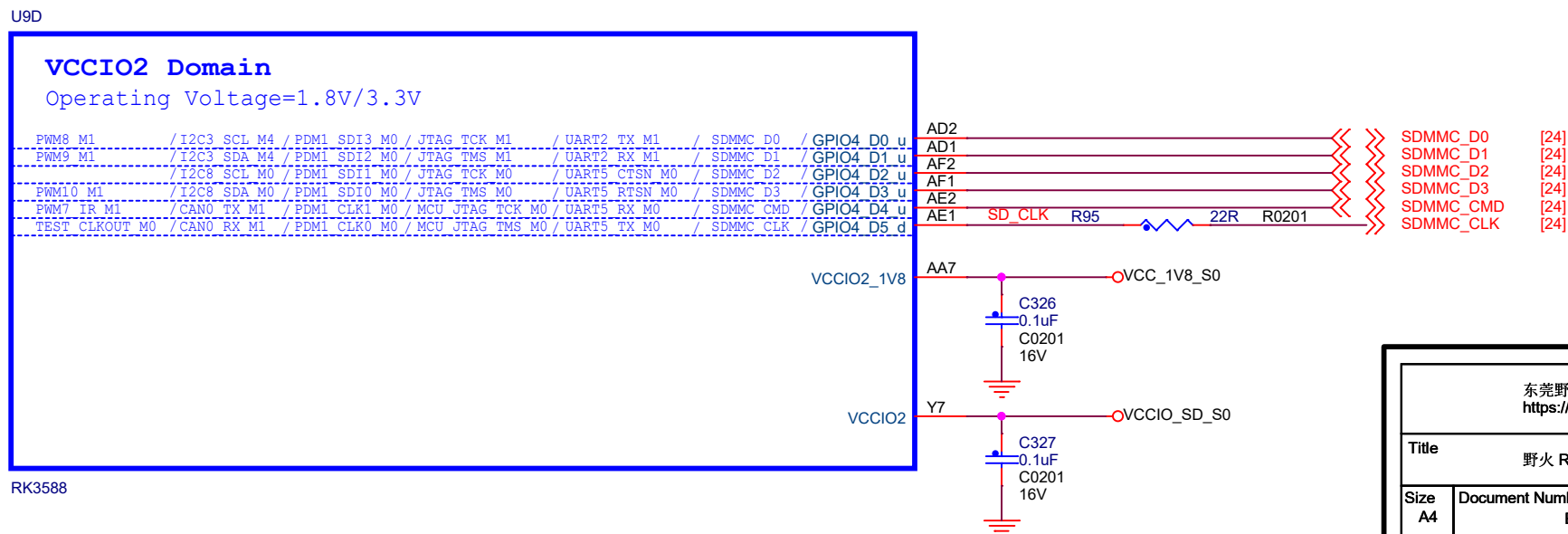


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RK3588_C (EMMCIO Domain)

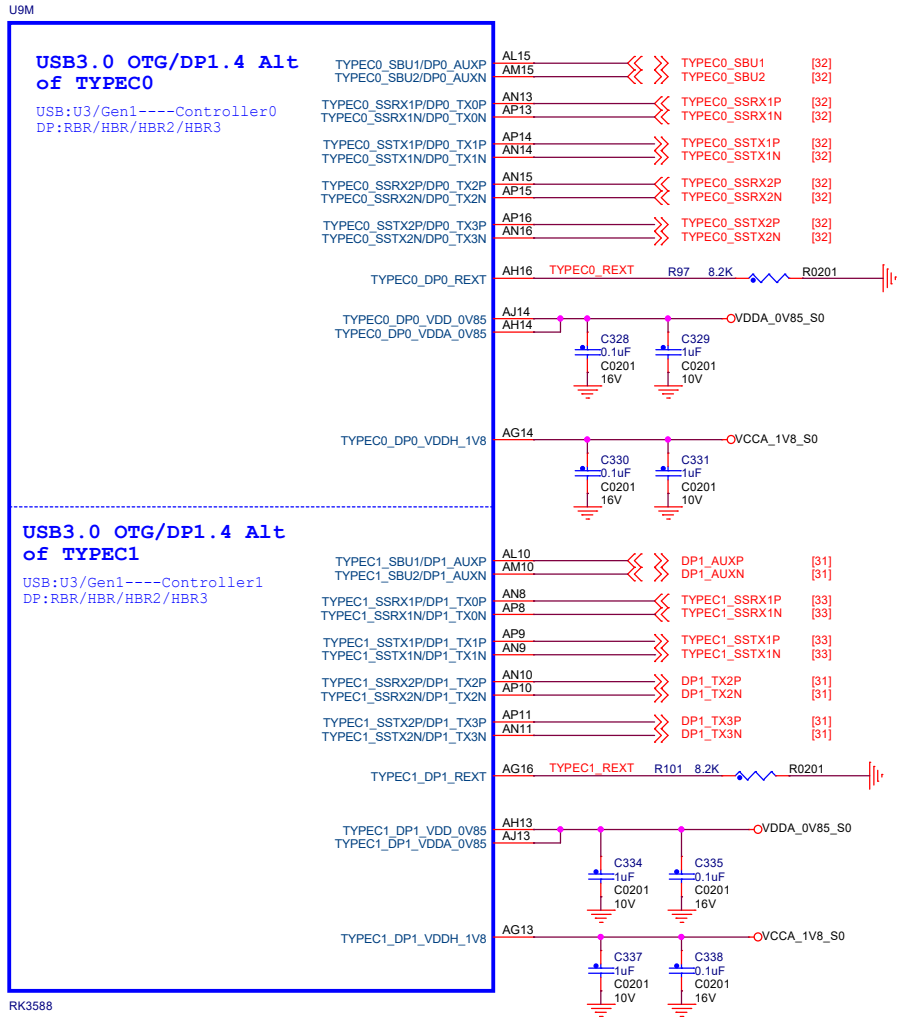


RK3588_D (VCCIO2 Domain)



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RK3588_M (TYPE-C/DP)

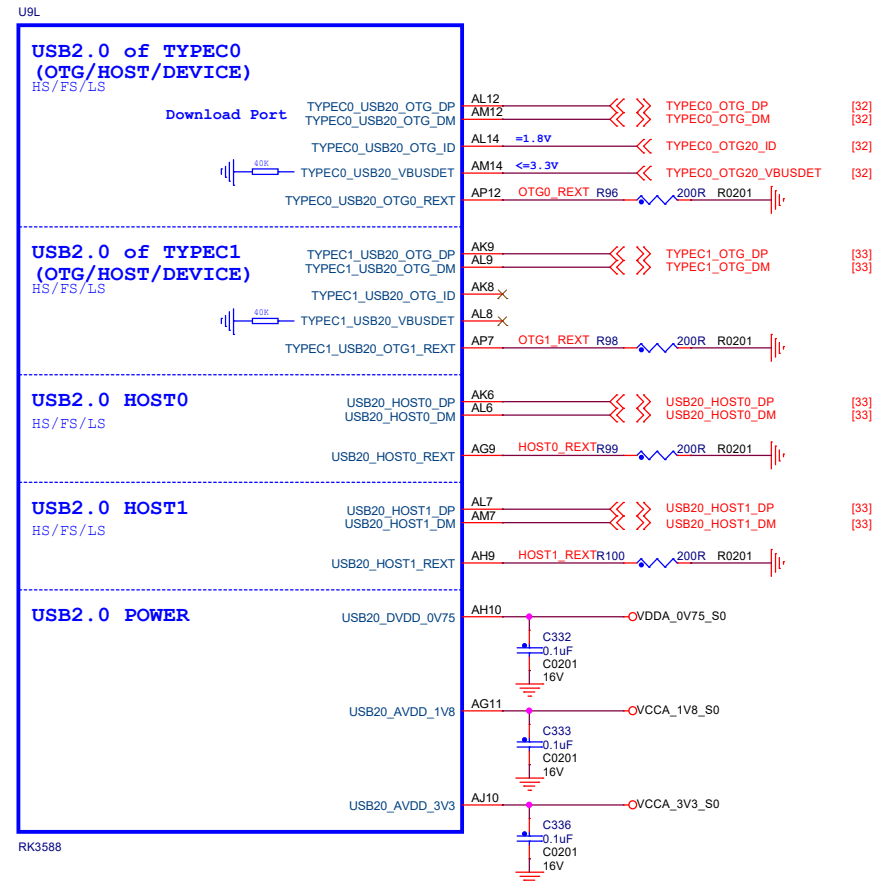


RK3588

USB30/DP1.4 Alt Mode Configuration

Option1	DP x4Lane	DP_TX_Lane0-3
Option2	USB30 x4Lane	DP_TX_Lane0-3
Option3	USB30X2Lane+DPX2Lane	USB30: Lane0 Lane1 DP: Lane2 Lane3
Option4	USB30X2Lane+DPX2Lane	USB30: Lane2 Lane3 DP: Lane0 Lane1

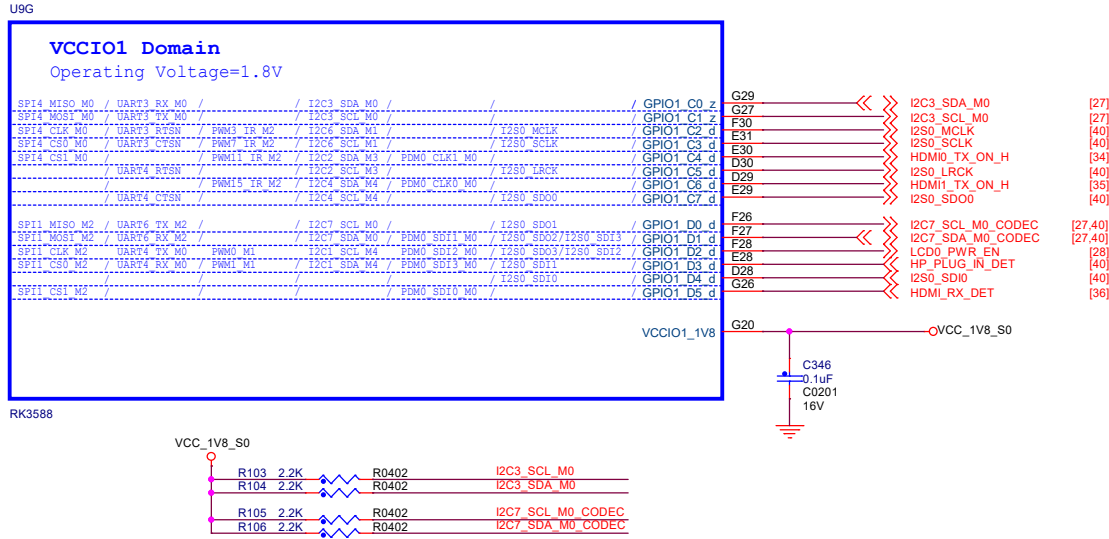
RK3588_L (USB2.0 HOST/OTG)



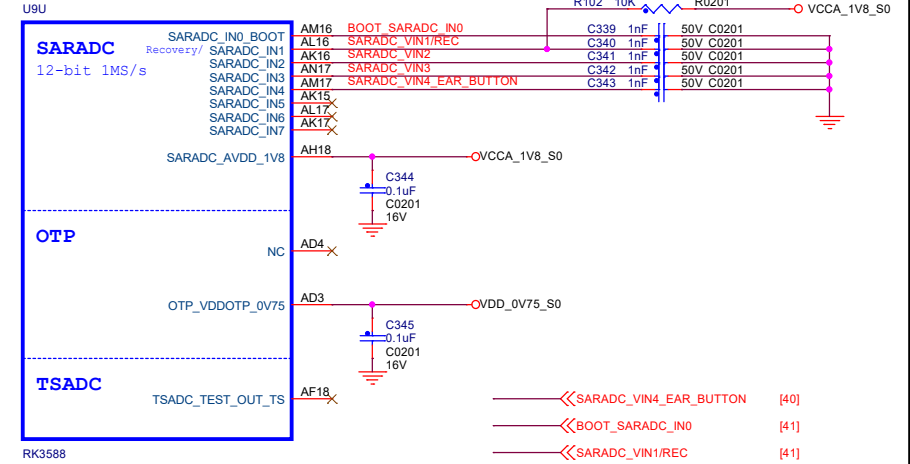
RK3588

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A3	USB20/TYPE C/DP PHY	V2R0
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RK3588_G (VCCIO1 Domain)



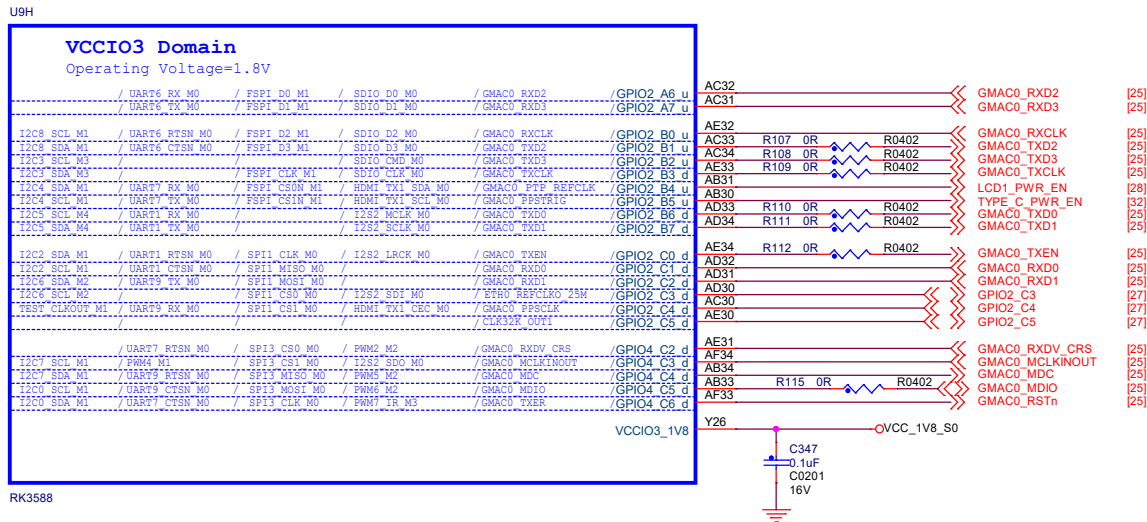
RK3588_U (SARADC/OTP)



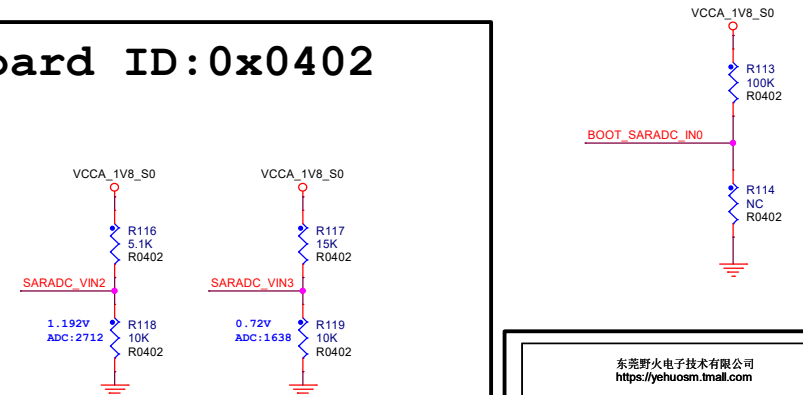
BOOT MODE CONFIG

Item	Rup	Rdown	ADC	VOL	BOOT MODE
LEVEL1	DNP	100K	0	0V	USB (Maskrom mode)
LEVEL2	100K	20K	682	0.3V	SD Card-USB
LEVEL3	100K	51K	1365	0.6V	EMMC-USB
LEVEL4	100K	100K	2047	0.9V	FSPI M0-USB
LEVEL5	100K	200K	2730	1.2V	FSPI M1-USB
LEVEL6	100K	499K	3412	1.5V	FSPI M2-USB
LEVEL7	100K	DNP	4095	1.8V	FSPI M2-FSPI M1-FSPI M0-EMMC-SD Card-USB

RK3588_H (VCCIO3 Domain)



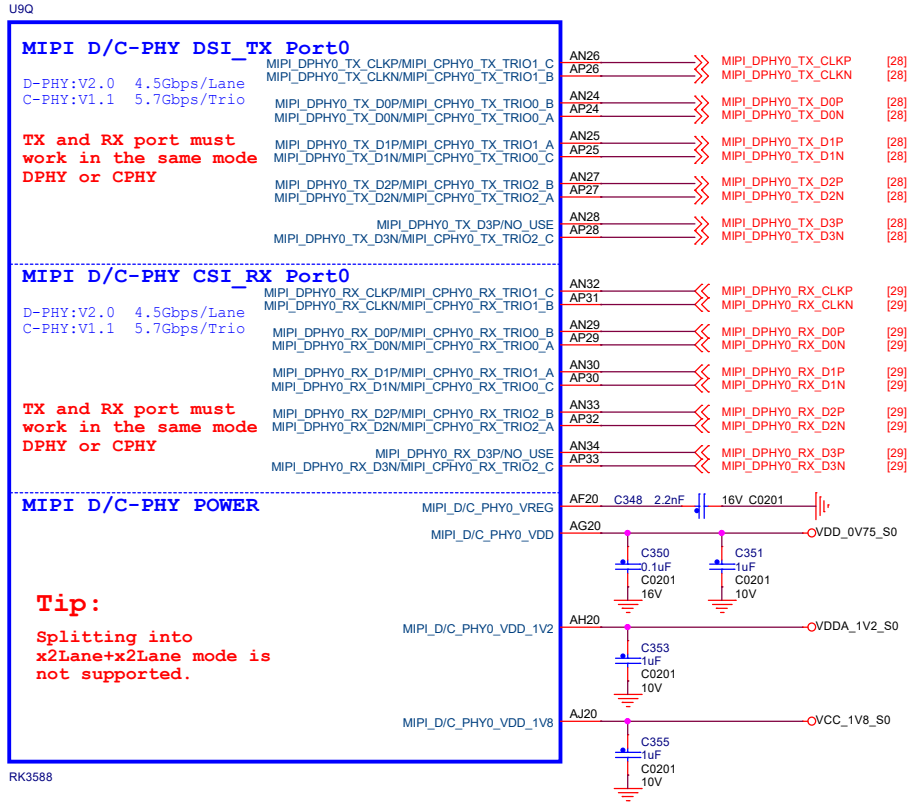
Board ID: 0x0402



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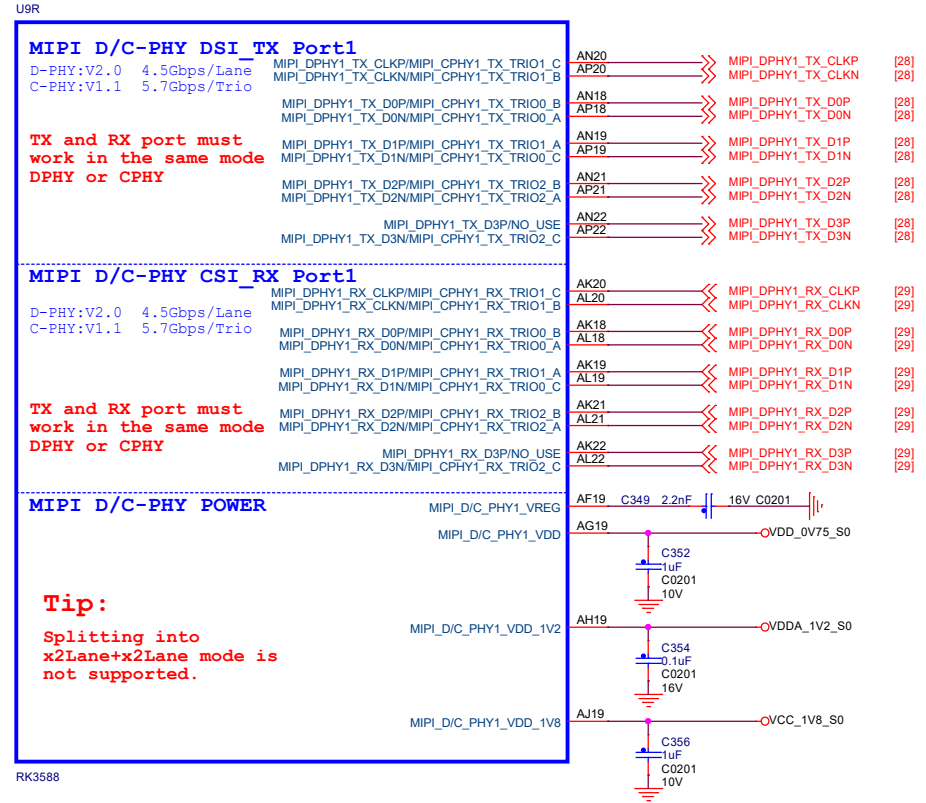
Title		
野火 RK3588 LubanCat 5 原理图		
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A3	SARADC/1.8V GPIO	V2R0
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RK3588_Q/R(MIPI_D/C_PHY0)



RK3588

RK3588_Q/R(MIPI_D/C_PHY1)



RK3588

About MIPI_D/C_PHY0_VDD Pin:

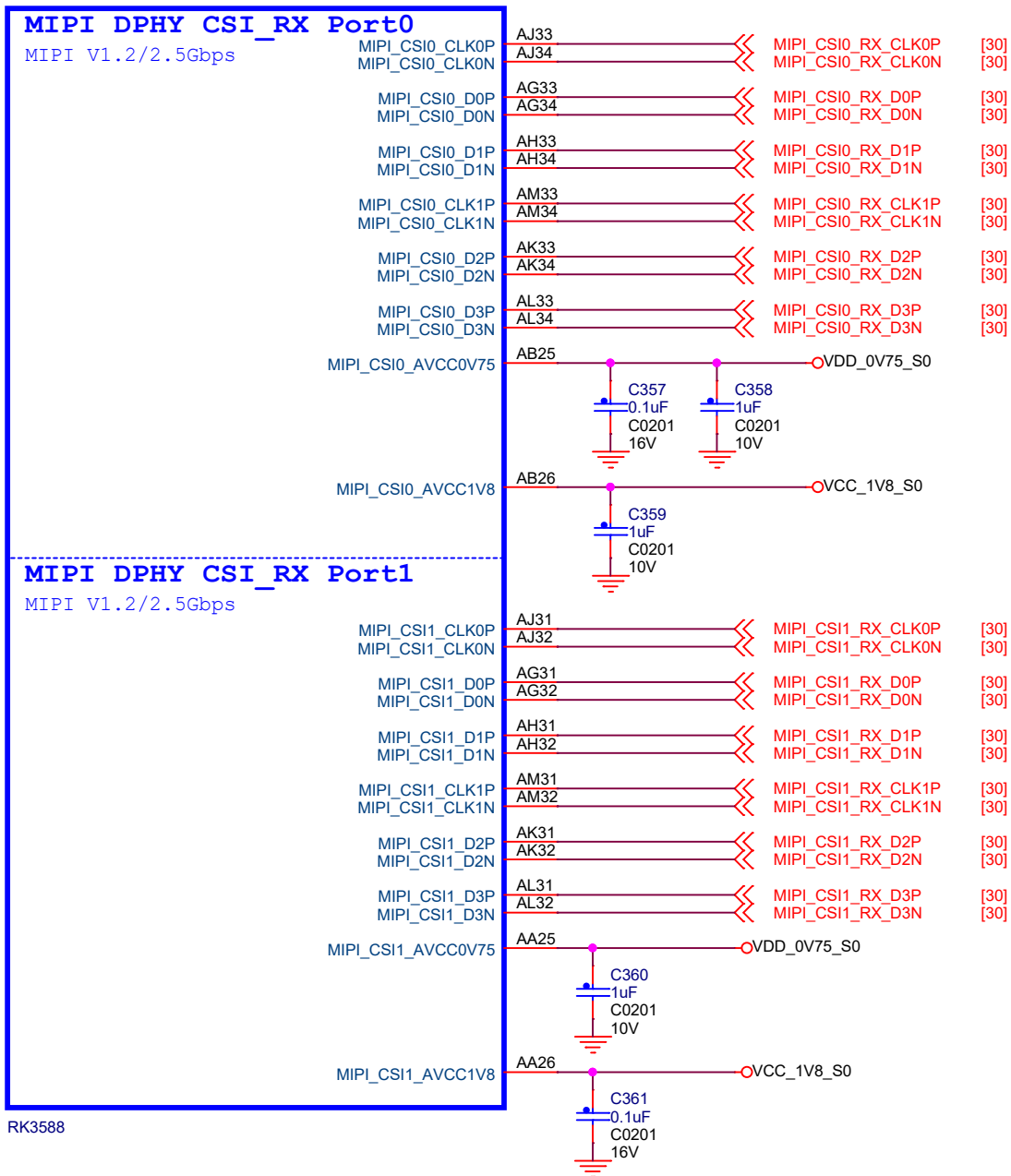
D-PHY 4.5Gbps & C-PHY 2.5Gsps 0.85V
D-PHY 2.5Gbps & C-PHY 1.5Gsps 0.75V

Default: 0.75V

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RK3588_P (MIPI_DPHY_CSI_RX_PHY)

U9P



RK3588

MIPI_CSI_RX Configuration

Option1	Sensor1 x4Lane	MIPI_CSI_RX_D0-3 MIPI_CSI_RX_CLK0
Option2	Sensor1 x2Lane	MIPI_CSI_RX_D0-1 MIPI_CSI_RX_CLK0
	+ Sensor2 x2Lane	MIPI_CSI_RX_D2-3 MIPI_CSI_RX_CLK1

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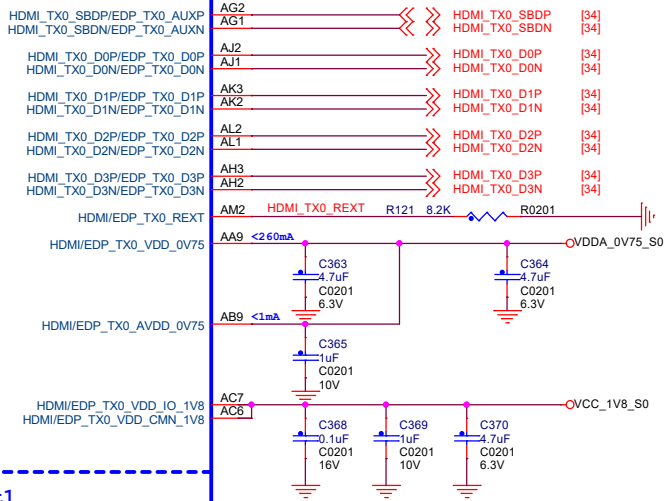
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RK3588_S (HDMI2.1 TX)

U9S

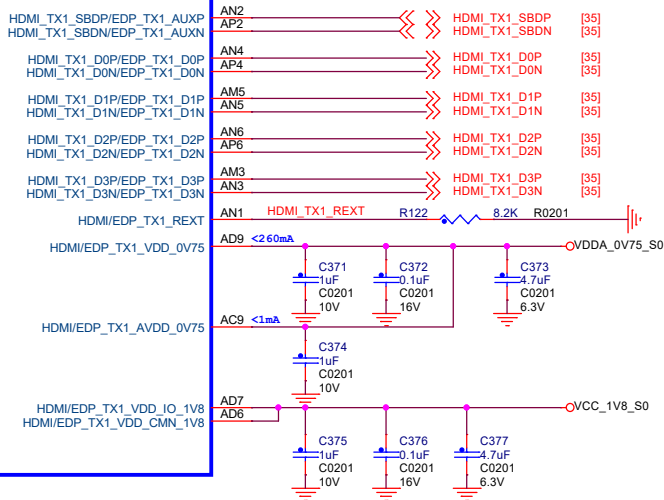
HDMI TX/eDP MUX Port0

HDMI:V2.1 12Gbps
eDP: V1.3 5.4Gbps



HDMI TX/eDP MUX Port1

HDMI:V2.1 12Gbps
eDP: V1.3 5.4Gbps



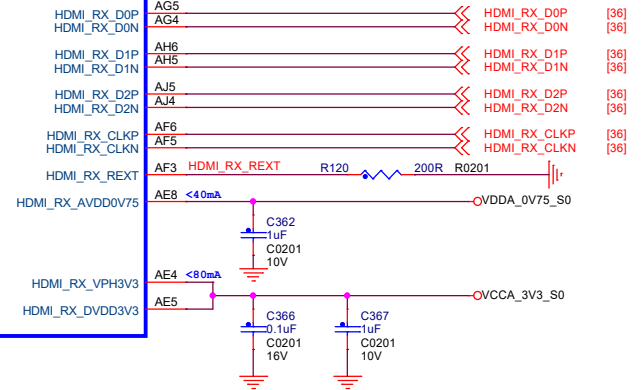
RK3588

RK3588_T (HDMI20 RX)

U9T

HDMI RX

HDMI:V2.0



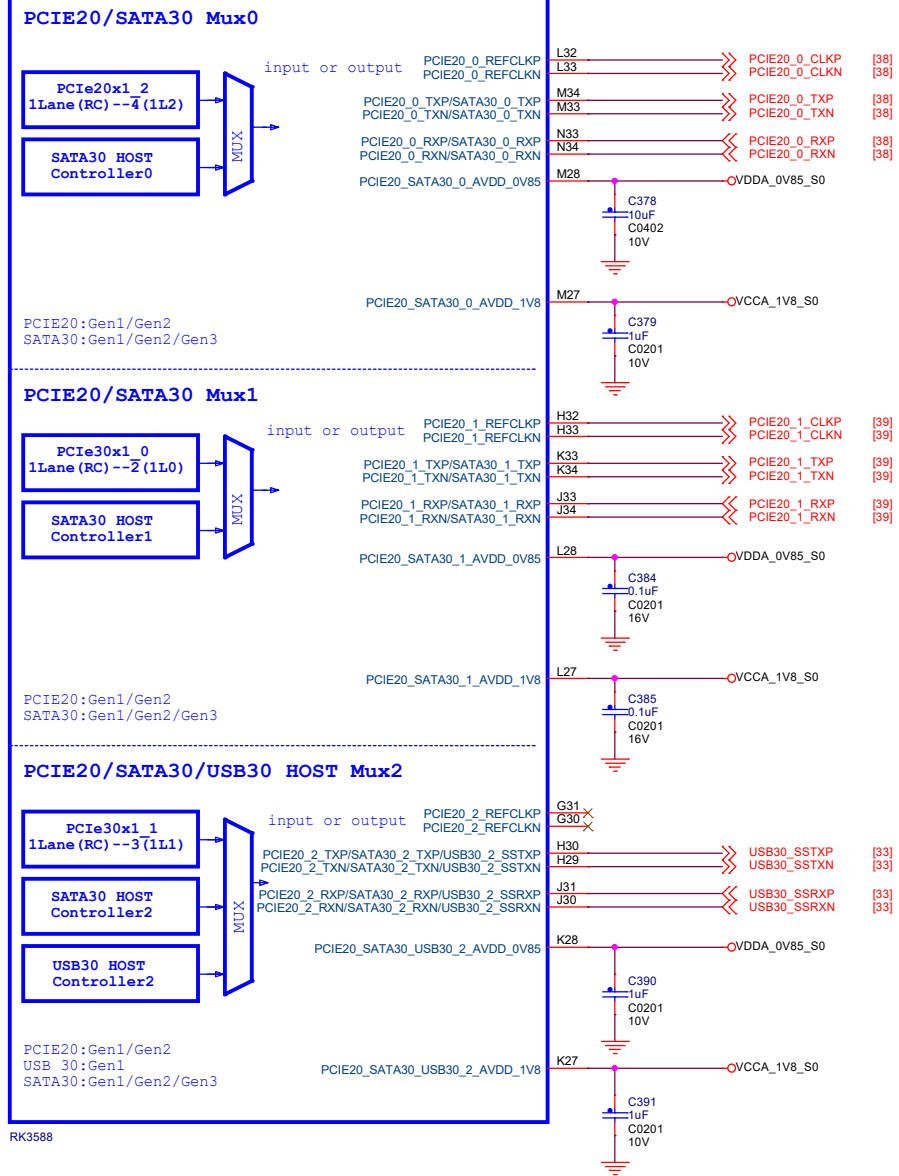
RK3588

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RK3588_N (PCIE20)

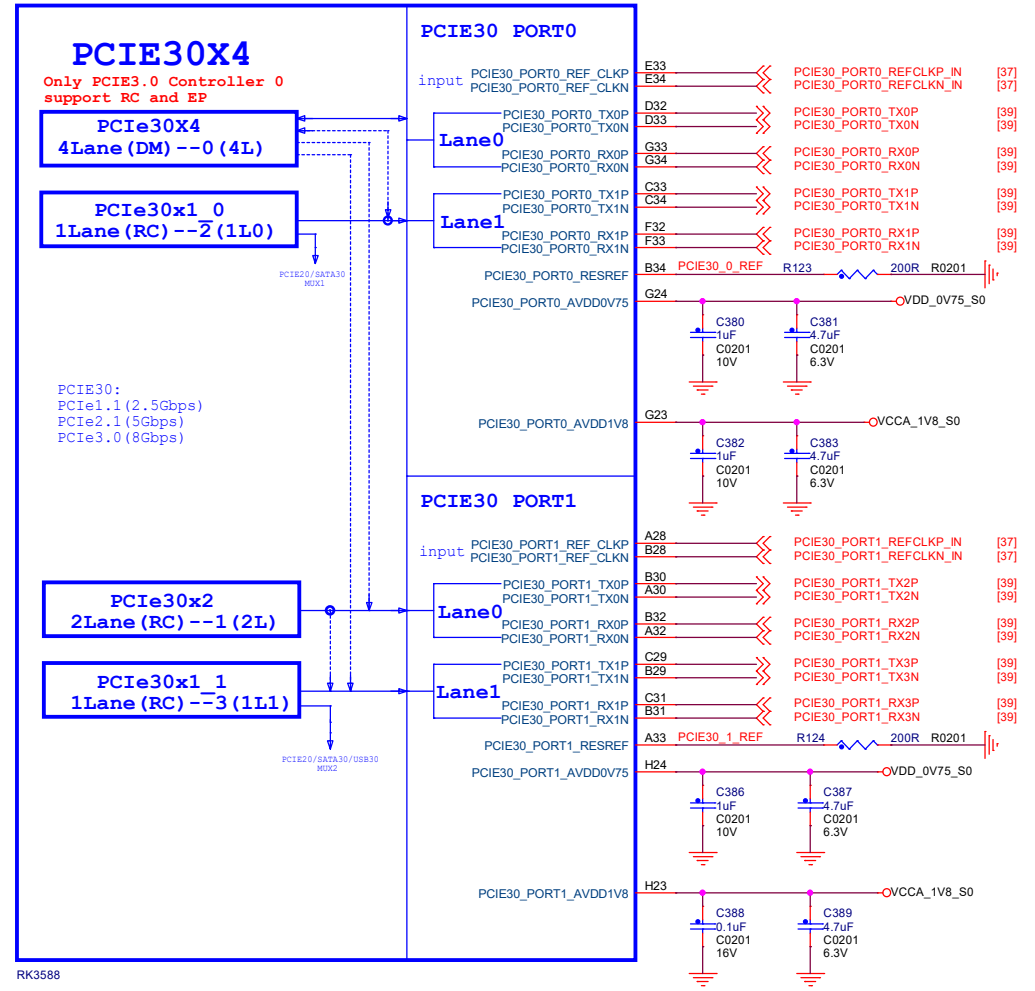
U9N



RK3588

RK3588_O (PCIE30)

U9O



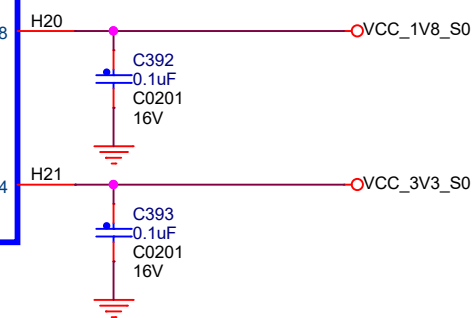
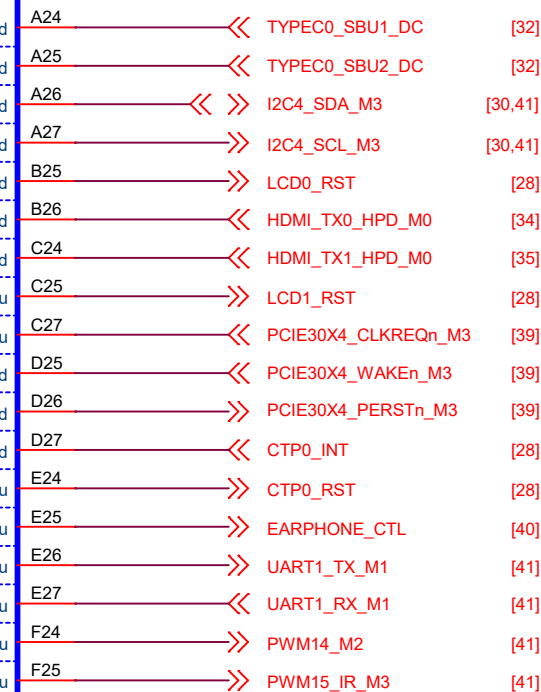
RK3588

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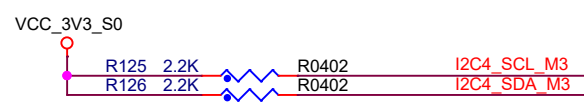
RK3588_I (VCCIO4 Domain)

U9I

VCCIO4 Domain	
Operating Voltage=1.8V/3.3V	
/SPI4_MISO_M2 /PCIE30X1_1_CLKREQN_M2/ DP0_HPDIN_M2 / I2C2_SDA_M4 / UART6_RX_M1 /GPIO1_A0_d	A24
SATA1_ACT_LED_M1 / / /SPI4_MOSI_M2 /PCIE30X1_1_WAKEN_M2 / DP1_HPDIN_M2 / I2C2_SCL_M4 / UART6_TX_M1 /GPIO1_A1_d	A25
/ PWM0_M2 /SPI4_CLK_M2 / / VOP_POST_EMPTY / I2C4_SDA_M3 / UART6_RTSN_M1/GPIO1_A2_d	A26
/ PWM1_M2 /SPI4_CS0_M2 / / HDMI_TX1_SDA_M2 / I2C4_SCL_M3 / UART6_CTSN_M1/GPIO1_A3_d	A27
/ /SPI2_MISO_M0 / / HDMI_TX1_SCL_M2 / / / /GPIO1_A4_d	B25
/ /SPI2_MOSI_M0 / / HDMI_TX0_HPD_M0 / / / /GPIO1_A5_d	B26
/ /SPI2_CLK_M0 / / / HDMI_TX1_HPD_M0 / / / /GPIO1_A6_d	C24
/ PWM3_IR_M3 /SPI2_CS0_M0 /PCIE30X1_1_PERSTN_M2 / / PDM1_SDI0_M1 / / /GPIO1_A7_u	C25
/ /SPI2_CS1_M0 /PCIE30X4_CLKREQN_M3 / / / PDM1_SDI1_M1 / / /GPIO1_B0_u	C27
/ /SPI0_MISO_M2 /PCIE30X4_WAKEN_M3 / / / PDM1_SDI2_M1 / / /GPIO1_B1_d	D25
/ /SPI0_MOSI_M2 /PCIE30X4_PERSTN_M3 / / / PDM1_SDI3_M1 / UART4_RX_M2 /GPIO1_B2_d	D26
SATA0_ACT_LED_M1 / / /SPI0_CLK_M2 /PCIE30X1_0_WAKEN_M2 / / / PDM1_CLK1_M1 / UART4_TX_M2 /GPIO1_B3_d	D27
/ /SPI0_CS0_M2 /PCIE30X1_0_PERSTN_M2 / / / PDM1_CLK0_M1 / UART7_RX_M2 /GPIO1_B4_u	E24
/ /SPI0_CS1_M2 /PCIE30X1_0_CLKREQN_M2/ / / / / UART7_TX_M2 /GPIO1_B5_u	E25
HDMI_RX_HPDOUT_M2/ /SPDIF0_TX_M0 /PCIE30X2_WAKEN_M3 / MIPI_CAMERA1_CLK_M0 / I2C5_SCL_M3 / UART1_TX_M1 /GPIO1_B6_u	E26
SATA2_ACT_LED_M1 / HDMI_RX_CEC_M2 / PWM13_M2 /SPDIF1_TX_M0 /PCIE30X2_PERSTN_M3 / MIPI_CAMERA2_CLK_M0 / I2C5_SDA_M3 / UART1_RX_M1 /GPIO1_B7_u	E27
HDMI_RX_SCL_M2 / PWM14_M2 / / / / MIPI_CAMERA3_CLK_M0 / I2C8_SCL_M2 / UART1_RTSN_M1/GPIO1_D6_u	F24
HDMI_RX_SDA_M2 / PWM15_IR_M3 / / / /PCIE30X2_CLKREQN_M3 / MIPI_CAMERA4_CLK_M0 / I2C8_SDA_M2 / UART1_CTSN_M1/GPIO1_D7_u	F25
	VCCIO4_1V8
	VCCIO4



RK3588



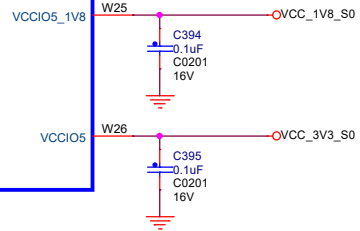
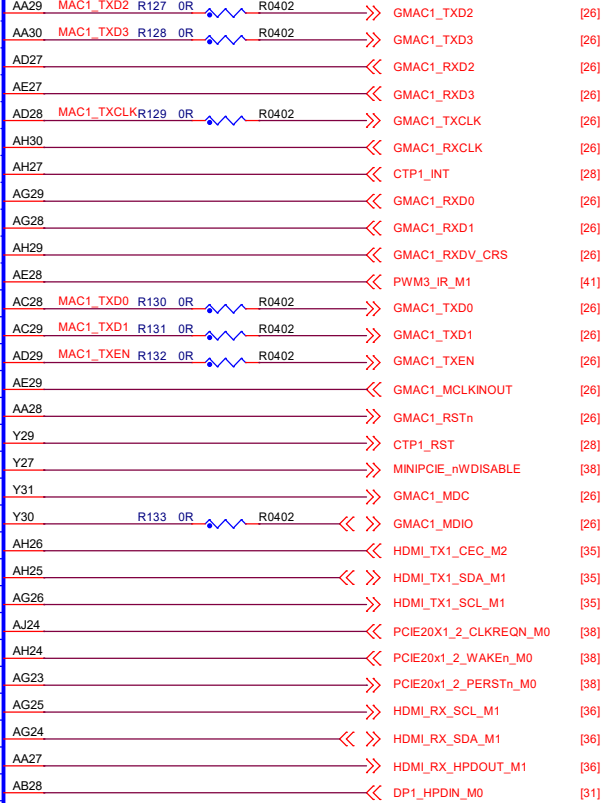
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Title 野火 RK3588 LubanCat 5 原理图		
Size A4	Document Number VCCIO 4 Interface	Rev V2R0
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RK3588_J (VCCIO5 Domain)

U9J

VCCIO5 Domain
Operating Voltage=1.8V/3.3V

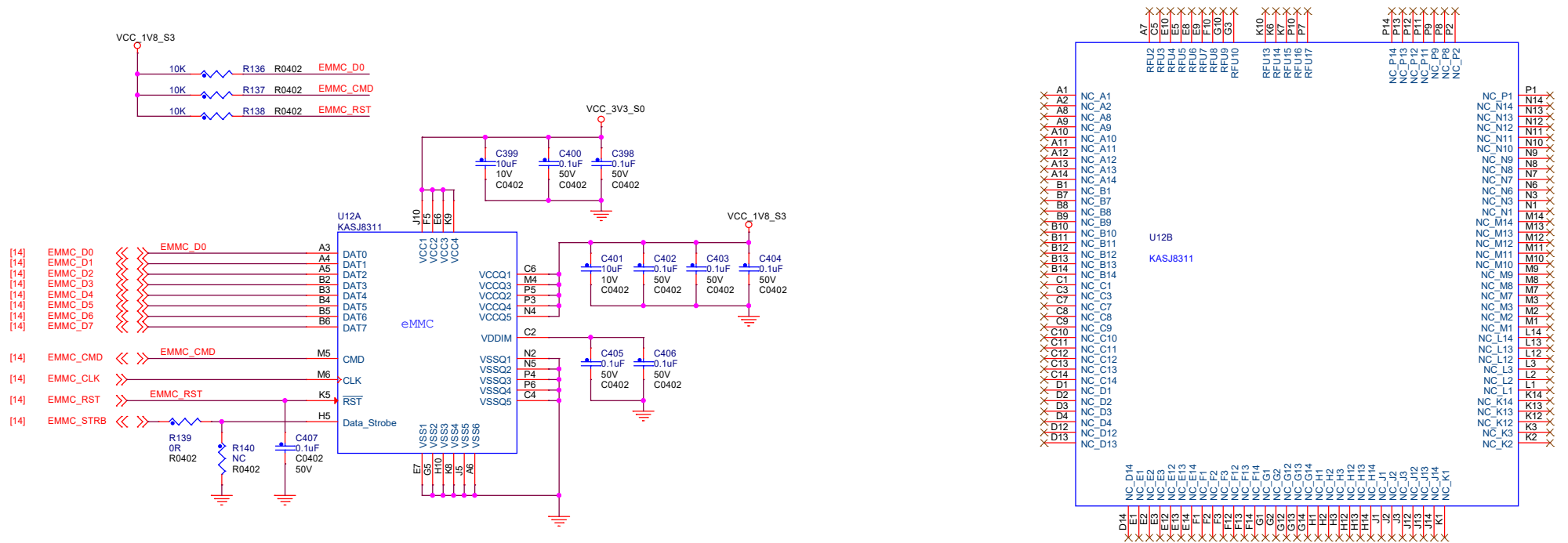
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AUDDSM_LN	/ SPI4_MOSI_M1	/ PWM11_IR_M0	/ I2C6_SCL_M4	/ FSP1_D1_M2	/ I2S3_SCLK	/ SDIO_D1_M1	/ GMAC1_TXD3	/ GPIO3_A1_U
AUDDSM_LP	/ SPI4_CLK_M1	/ UART8_TX_M1	/	/ FSP1_D2_M2	/ I2S3_LRCK	/ SDIO_D2_M1	/ GMAC1_RXD2	/ GPIO3_A2_U
AUDDSM_RN	/ SPI4_CS0_M1	/ UART8_RX_M1	/	/ FSP1_D3_M2	/ I2S3_SDO	/ SDIO_D3_M1	/ GMAC1_RXD3	/ GPIO3_A3_U
AUDDSM_RP	/ SPI4_CS1_M1	/ UART8_RTSN_M1	/	/	/ I2S3_SDI	/ SDIO_CMD_M1	/ GMAC1_TXCLK	/ GPIO3_A4_d
	/ MIPI_CAMERA0_CLK_M1	/ UART8_RTSN_M1	/ I2C4_SDA_M0	/ FSP1_CLK_M2	/	/ SDIO_CLK_M1	/ GMAC1_RXCLK	/ GPIO3_A5_d
	/ MIPI_CAMERA1_CLK_M1	/	/ I2C4_SCL_M0	/	/	/	/ ETH1_REFCLK0_25M	/ GPIO3_A6_d
PWM8_M0	/ MIPI_CAMERA2_CLK_M1	/	/	/	/	/	/ GMAC1_RXD0	/ GPIO3_A7_U
PWM9_M0	/ MIPI_CAMERA3_CLK_M1	/	/	/	/	/	/ GMAC1_RXD1	/ GPIO3_B0_U
PWM2_M1	/ MIPI_CAMERA4_CLK_M1	/ UART2_TX_M2	/	/	/	/ GMAC1_RXDV_CRS	/ GPIO3_B1_d	
PWM3_IR_M1	/	/ UART2_RX_M2	/	/	/ I2S2_SDI_M1	/	/ GMAC1_TXER	/ GPIO3_B2_d
	/	/ UART2_RTSN	/	/	/ I2S2_SDO_M1	/	/ GMAC1_TXD0	/ GPIO3_B3_U
	/	/ UART2_CTSN	/	/	/ I2S2_MCLK_M1	/	/ GMAC1_TXD1	/ GPIO3_B4_U
PWM12_M0	/ CAN1_RX_M0	/ UART3_TX_M1	/	/	/ I2S2_SCLK_M1	/	/ GMAC1_TXEN	/ GPIO3_B5_U
PWM13_M0	/ CAN1_TX_M0	/ UART3_RX_M1	/	/	/ I2S2_LRCK_M1	/	/ GMAC1_MCLKINOUT	/ GPIO3_B6_d
	/	/	/ I2C3_SCL_M1	/ SPI1_MOSI_M1	/ HDMI_TX1_HPD_M1	/	/ GMAC1_PTP_REF_CLK	/ GPIO3_B7_d
	/	/ UART7_TX_M1	/ I2C3_SDA_M1	/ SPI1_MISO_M1	/	/	/ GMAC1_PPSTRIG	/ GPIO3_C0_d
	/ PCIE30X2_BUTTON_BSTN	/ UART7_RX_M1	/	/	/ SPI1_CLK_M1	/	/ GMAC1_PPSCCLK	/ GPIO3_C1_d
PWM14_M0	/	/ UART7_RTSN_M1	/ I2C8_SCL_M4	/ SPI1_CS0_M1	/	/ MIPI_TE0	/ GMAC1_MDC	/ GPIO3_C2_d
PWM15_IR_M0	/	/ UART7_CTSN_M1	/ I2C8_SDA_M4	/ SPI1_CS1_M1	/	/ MIPI_TE1	/ GMAC1_MDIO	/ GPIO3_C3_d
CAN2_RX_M0	/ PCIE30X4_CLKREQN_M2	/ UART5_TX_M1	/ FSP1_CS0N_M2	/ SPI3_CS0_M3	/ HDMI_TX1_CEC_M2	/	/ CIF_D8	/ GPIO3_C4_U
CAN2_TX_M0	/ PCIE30X4_WAKEN_M2	/ UART5_RX_M1	/ FSP1_CS1N_M2	/ SPI3_CS1_M3	/ HDMI_TX1_SDA_M1	/	/ CIF_D9	/ GPIO3_C5_U
	/ PCIE30X4_PERSTN_M2	/	/	/ SPI3_MISO_M3	/ HDMI_TX1_SCL_M1	/	/ CIF_D10	/ GPIO3_C6_U
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PWM8_M2	/ PCIE20X1_2_WAKEN_M0	/ UART4_RX_M1	/ I2C5_SDA_M0	/ SPI3_CLK_M3	/ HDMI_TX0_SDA_M2	/	/ CIF_D12	/ GPIO3_D0_U
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	/ PCIE30X2_CLKREQN_M2	/ UART9_RTSN_M2	/ I2C7_SCL_M2	/ SPI0_MOSI_M3	/ HDMI_RX_SCL_M1	/	/ CIF_D14	/ GPIO3_D2_d
PWM10_M2	/ PCIE30X2_WAKEN_M2	/ UART9_CTSN_M2	/ I2C7_SDA_M2	/ SPI0_CLK_M3	/ HDMI_RX_SDA_M1	/	/ CIF_D15	/ GPIO3_D3_d
	/ PCIE30X2_PERSTN_M2	/ UART9_RX_M2	/	/ SPI0_CS0_M3	/ HDMI_RX_HPDOUT_M1	/ HDMI_TX0_HPD_M1	/ MCU_JTAG_TCK_M1	/ GPIO3_D4_d
PWM11_IR_M3	/ PCIE30X4_BUTTON_BSTN	/ UART9_TX_M2	/	/ SPI0_CS1_M3	/ DPI_HPDIN_M0	/	/ MCU_JTAG_TMS_M1	/ GPIO3_D5_d



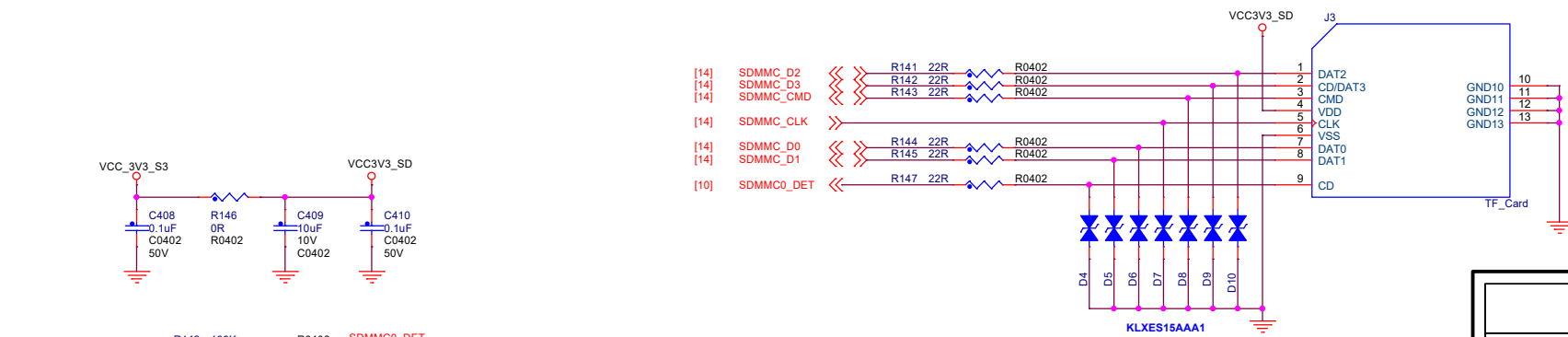
RK3588

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EMMC FLASH



Micro SD Card



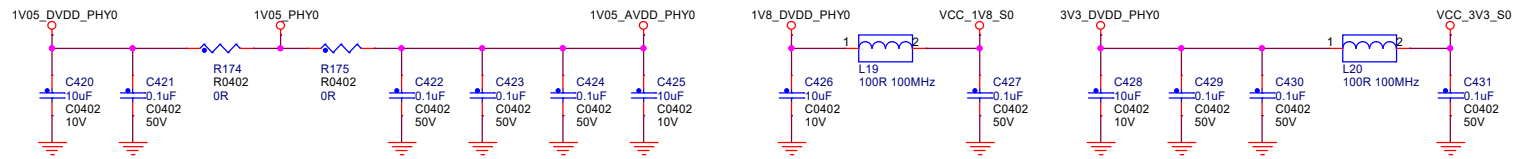
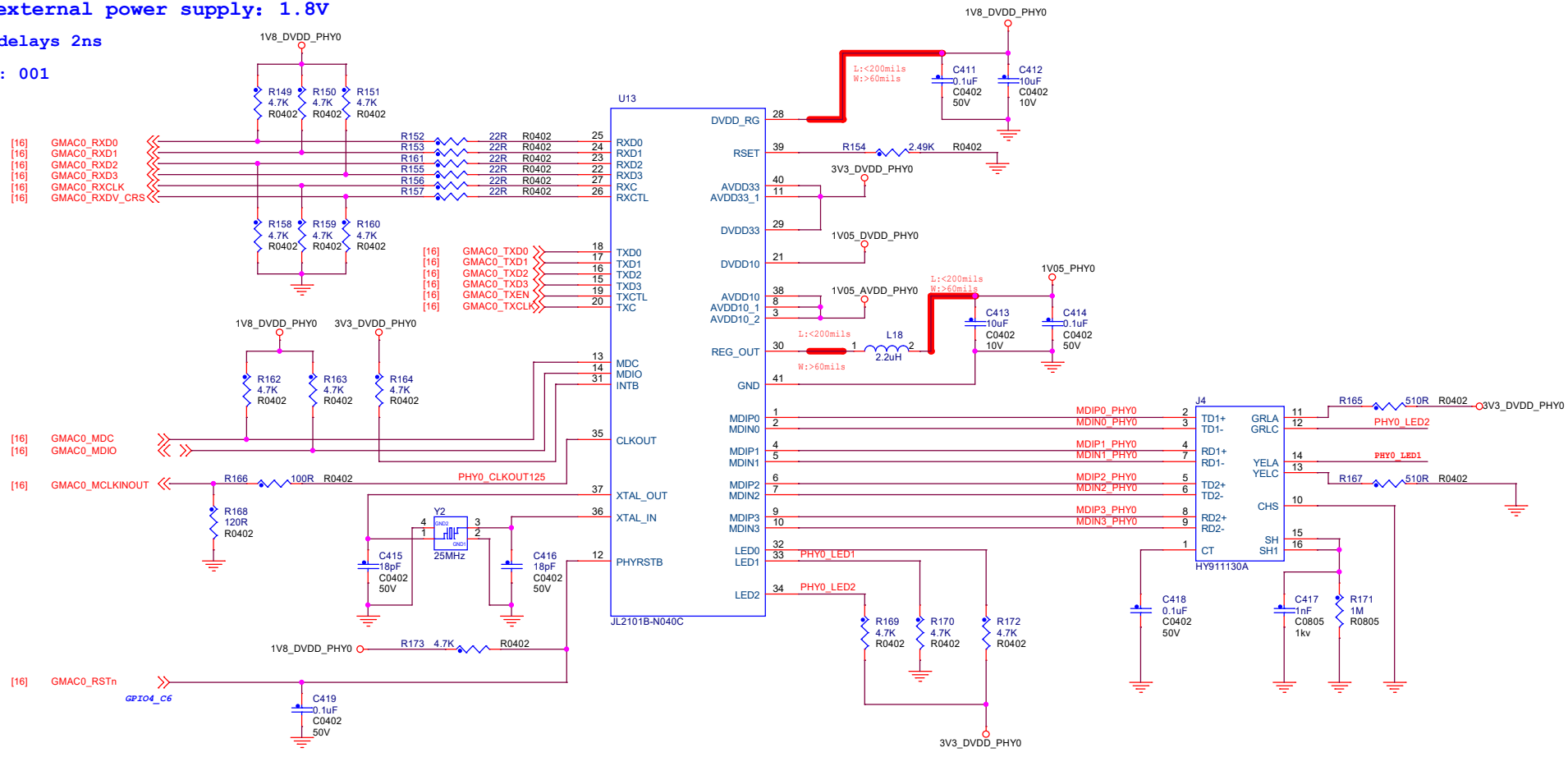
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Title	野火 RK3588 LubanCat 5 原理图	
Size	Document Number	Rev
A3	EMMC_FLASH/Micro SD	V2R0
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ETH_1

IO Use an external power supply: 1.8V

TXC / RXC : delays 2ns

PHY Address : 001



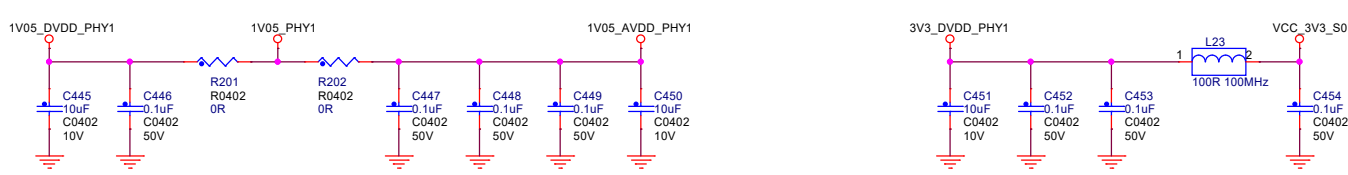
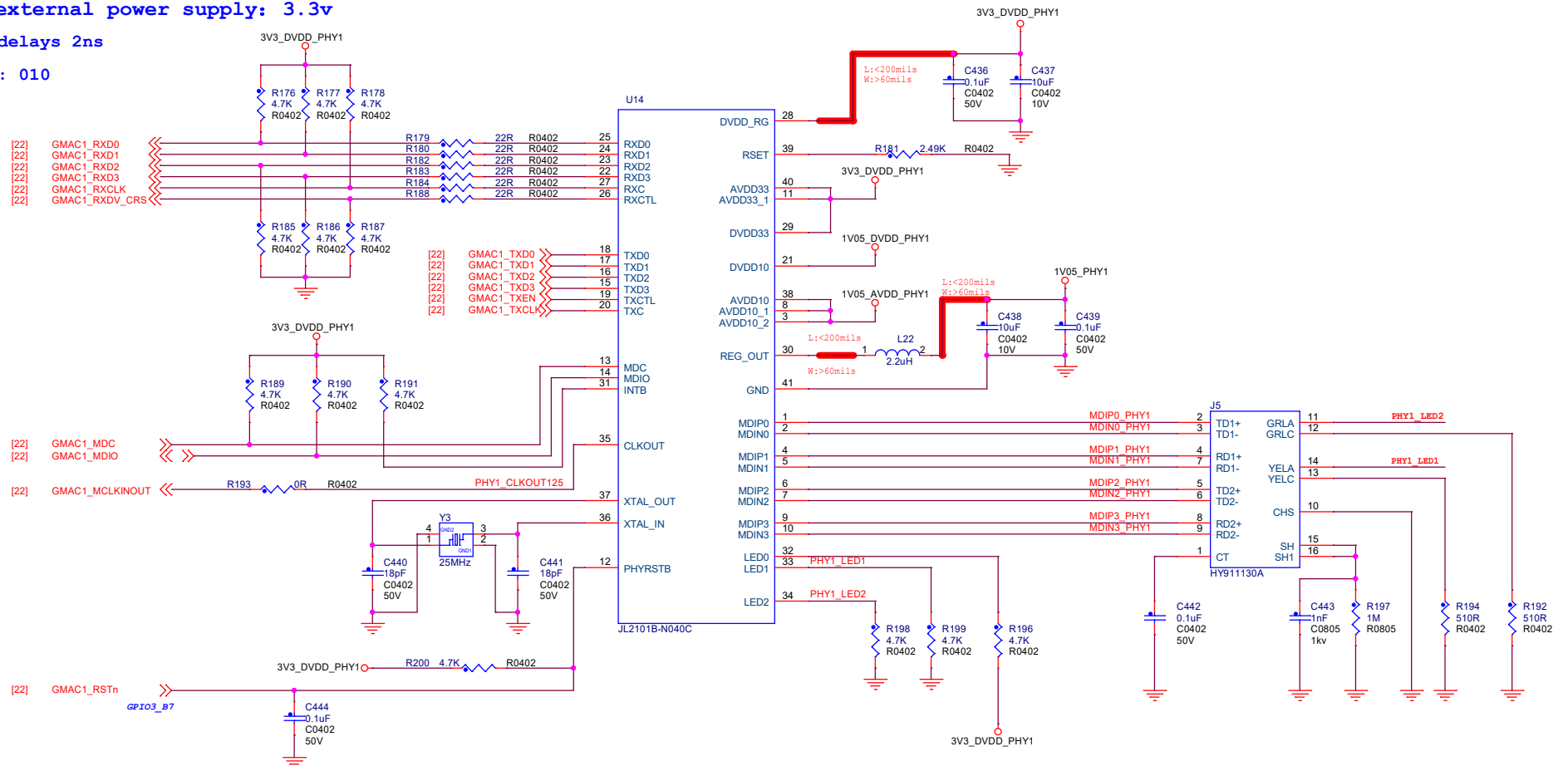
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ETH_0

IO Use an external power supply: 3.3v

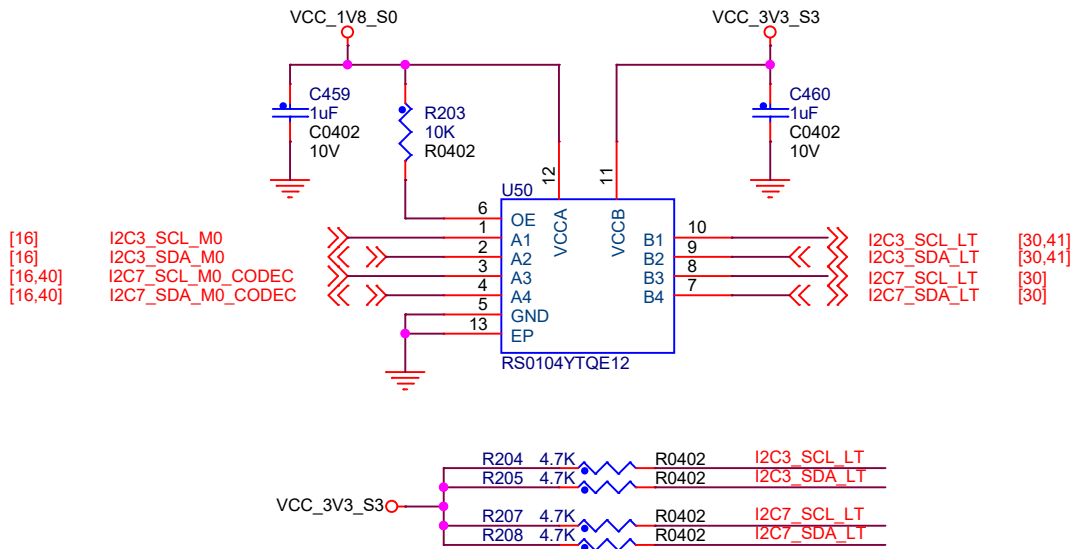
TXC / RXC : delays 2ns

PHY Address : 010

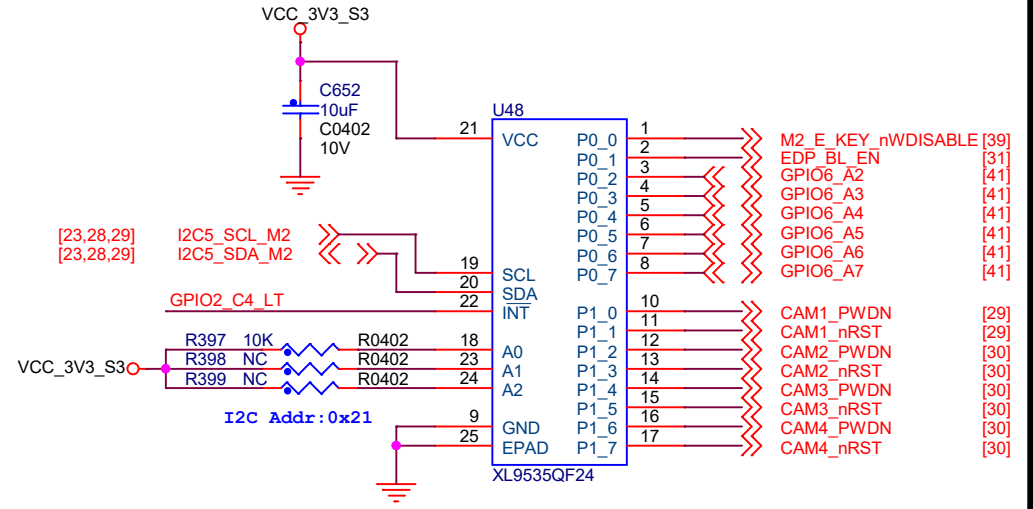


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Title 野火 RK3588 LubanCat 5 原理图		
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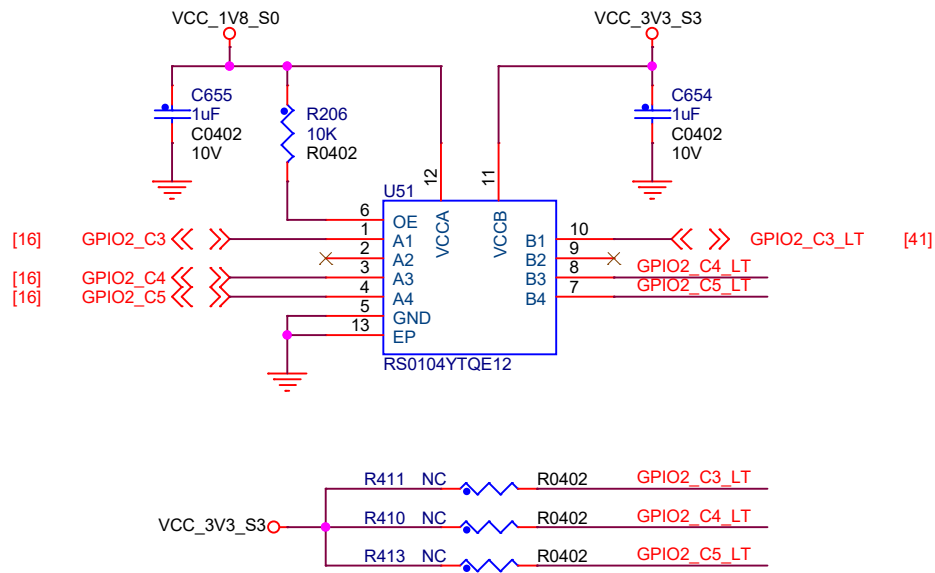
I2C Level Translation



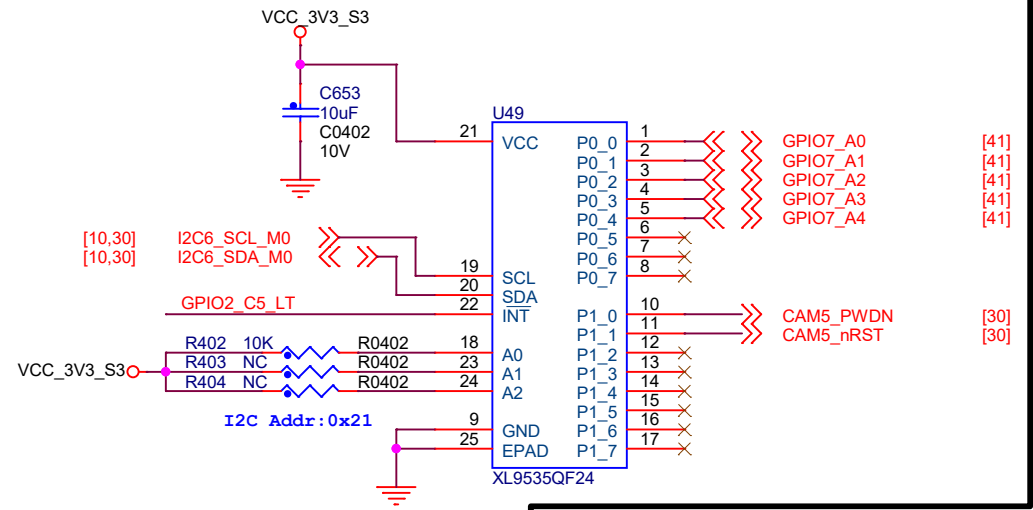
I/O Expand GPIO6



GPIO Level Translation



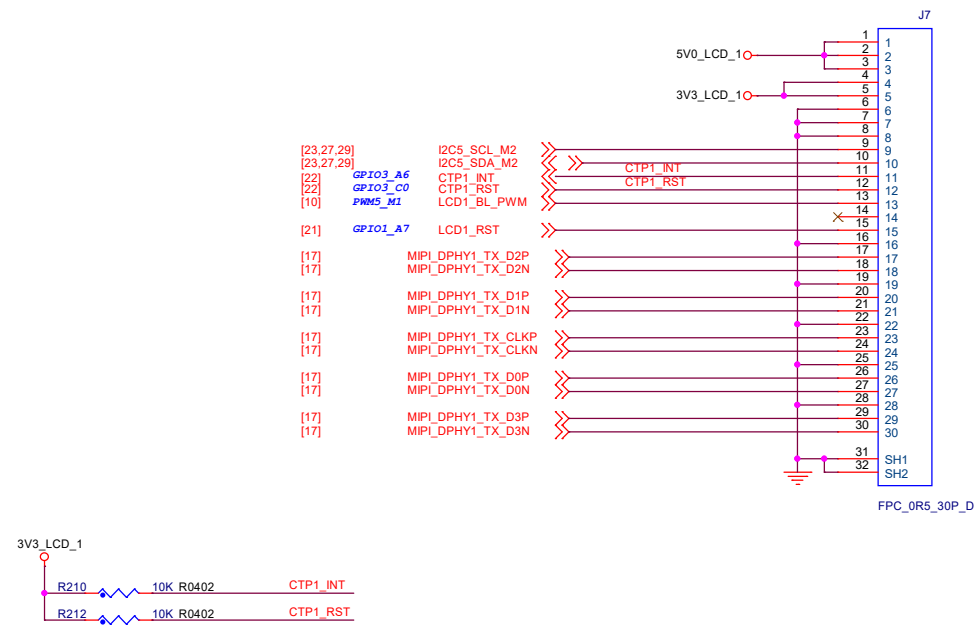
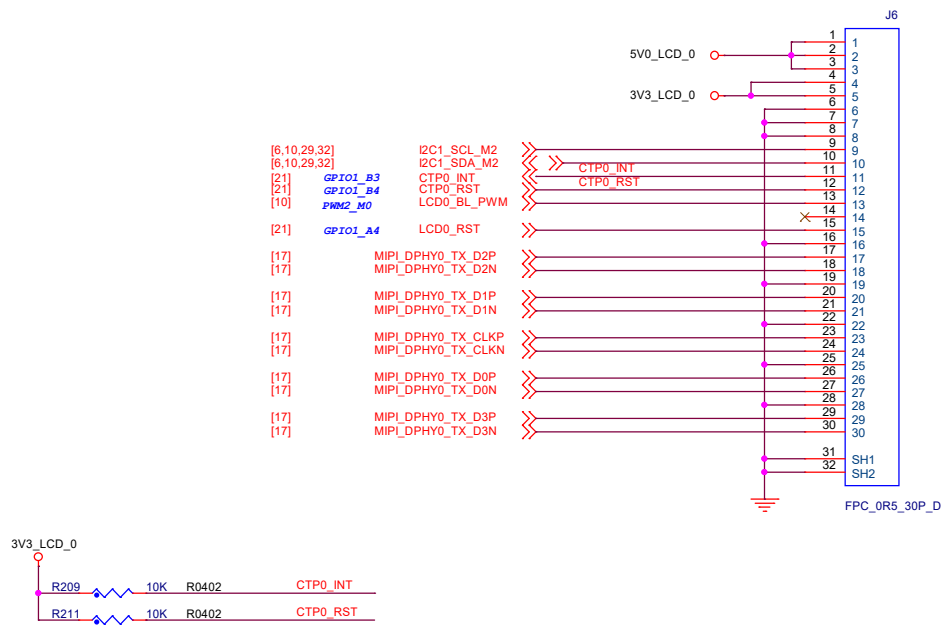
I/O Expand GPIO7



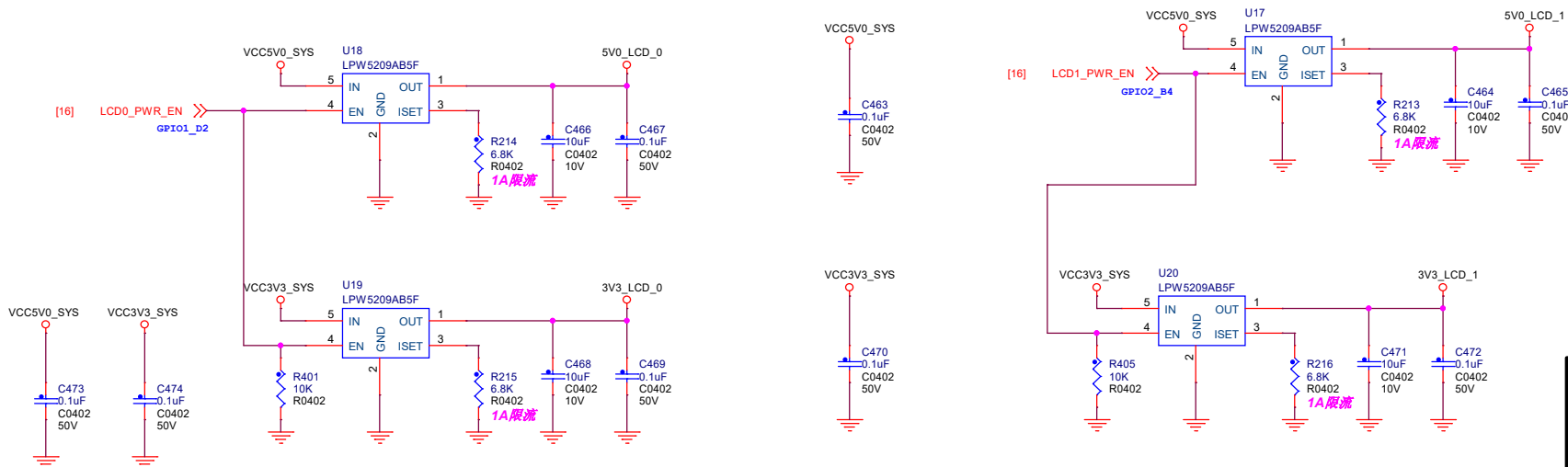
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Size A4	Document Number I2C/GPIO Level Translation	Rev V2R0
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MIPI_DSI_TX0 PORT

MIPI_DSI_TX1 PORT

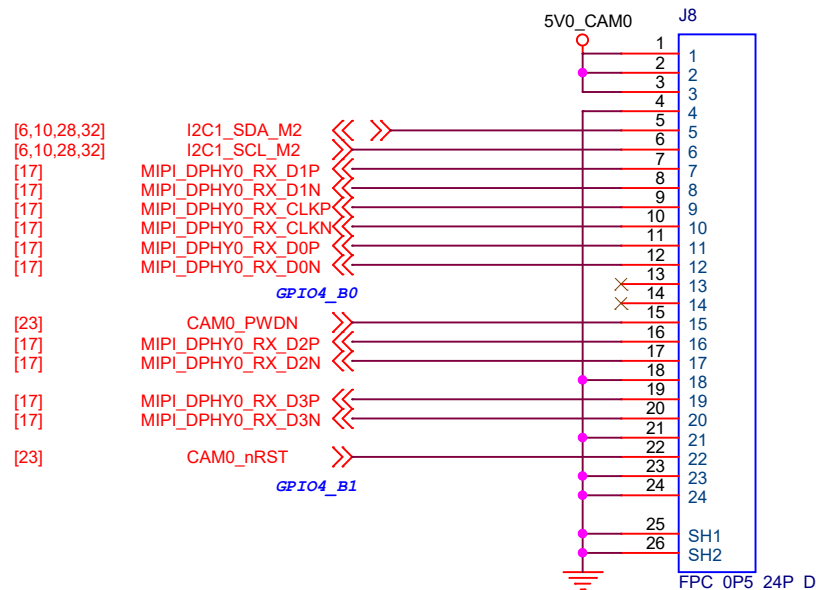


MIPI DSI Power

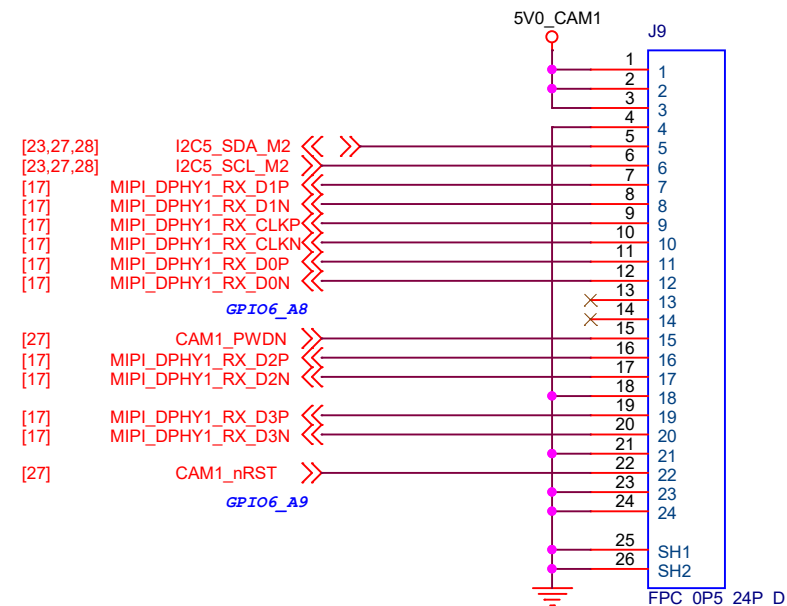


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Title 野火 RK3588 LubanCat 5 原理图		
Size A3	Document Number MIPI DSI PORT	Rev V2R0
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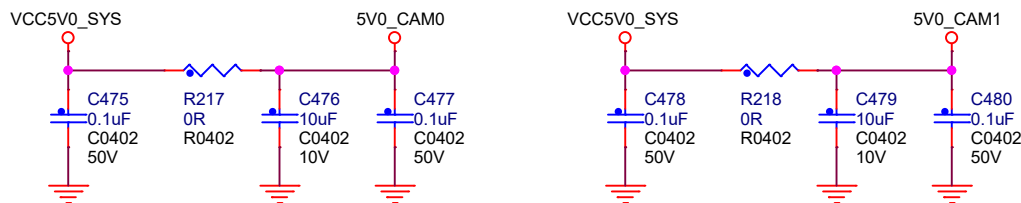
MIPI CSI 0 PORT



MIPI CSI 1 PORT



MIPI CSI Power



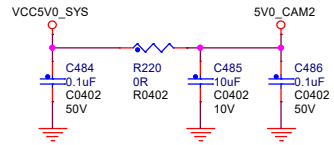
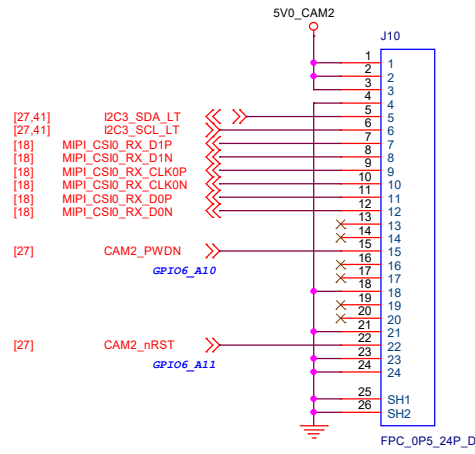
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Title 野火 RK3588 LubanCat 5 原理图

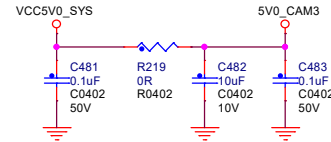
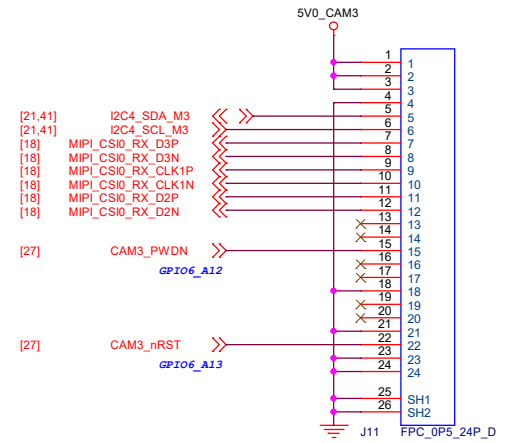
Size A4	Document Number MIPI DSI PORT1	Rev V2R0
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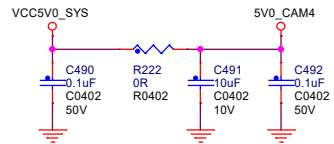
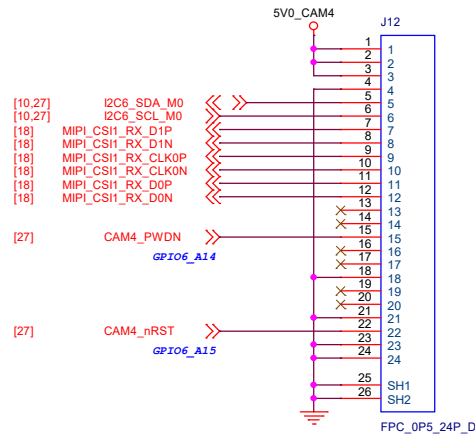
MIPI_CSI2_PORT



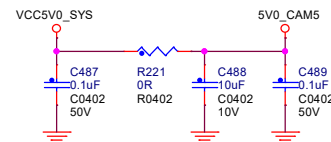
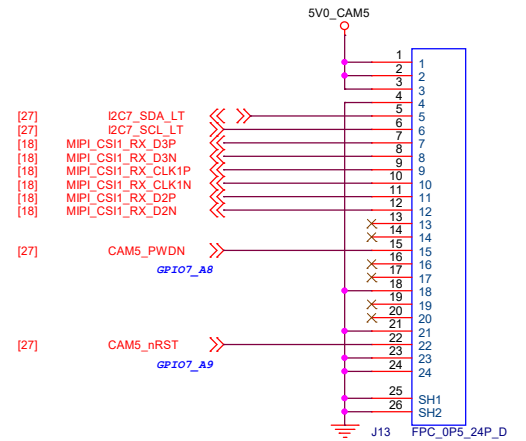
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MIPI_CSI4_PORT

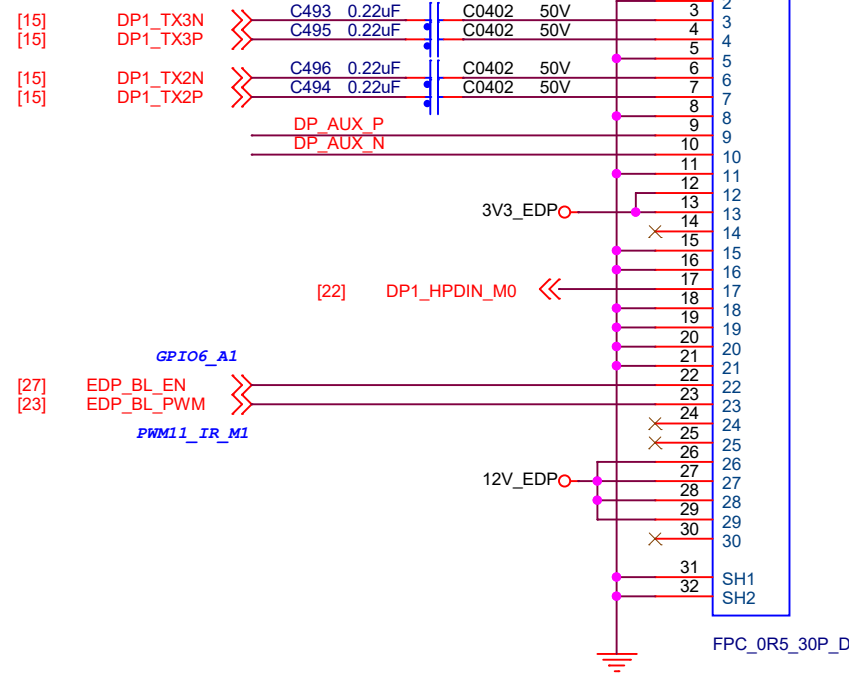
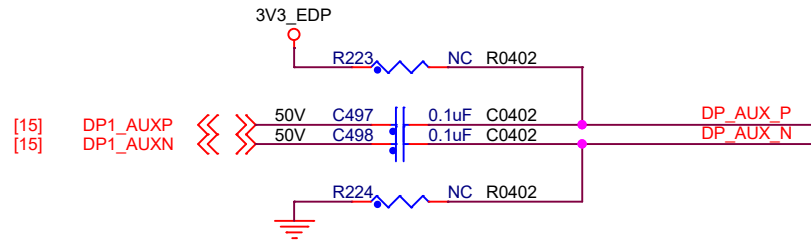


MIPI_CSI5_PORT

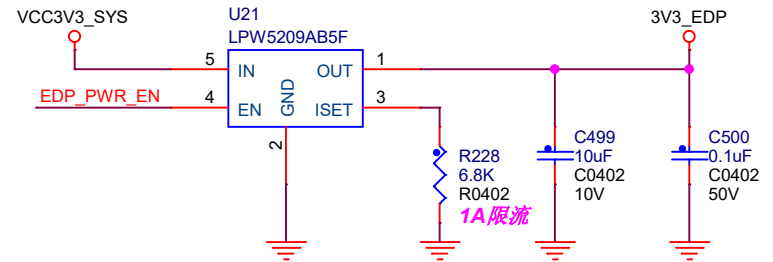
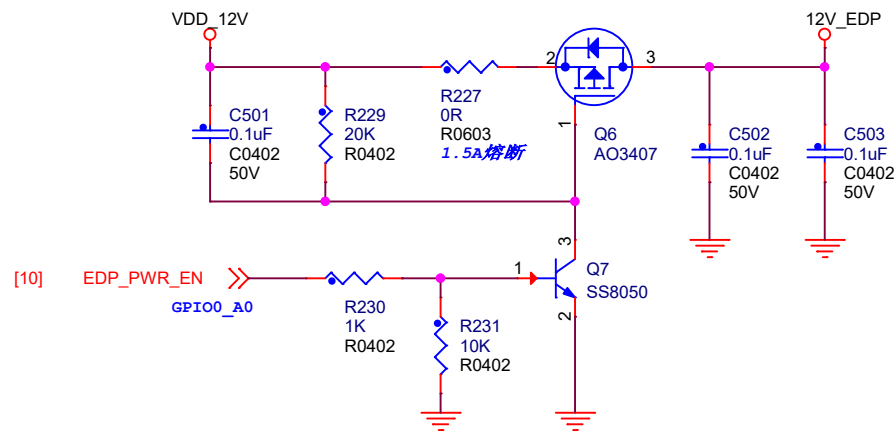


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eDP1.3 PORT



EDP Power



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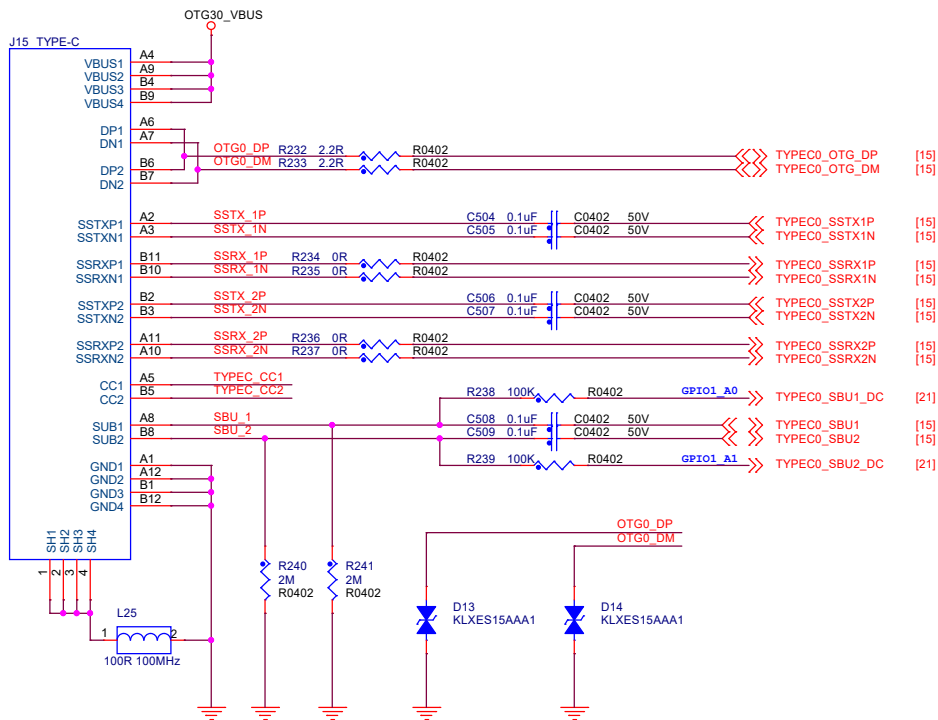
Title 野火 RK3588 LubanCat 5 原理图

Size A4	Document Number eDP_1.3_PORT	Rev V2R0
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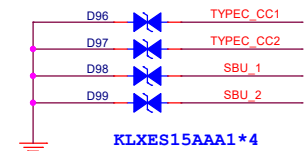
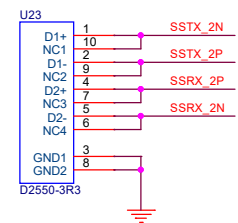
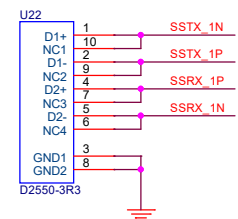
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TYPE C Socket

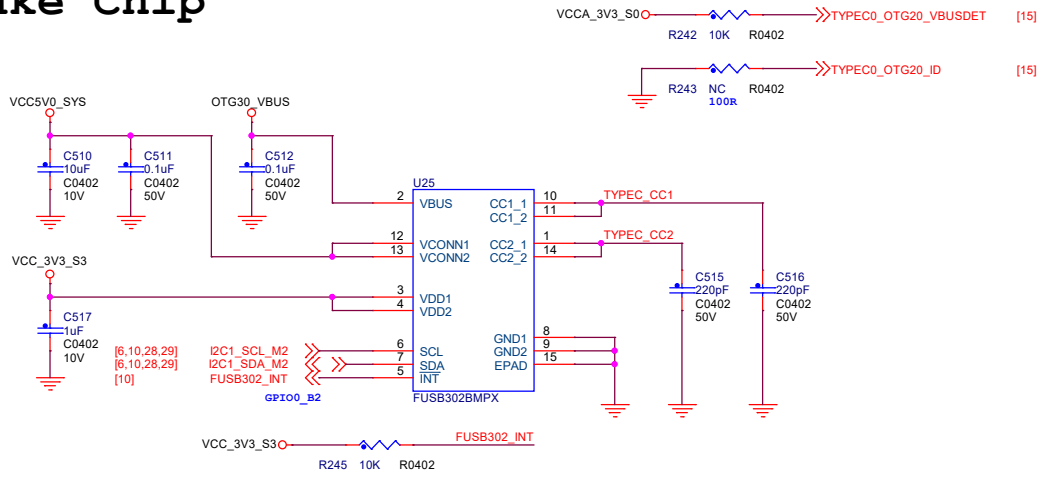
OTG30/Download PORT



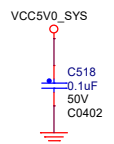
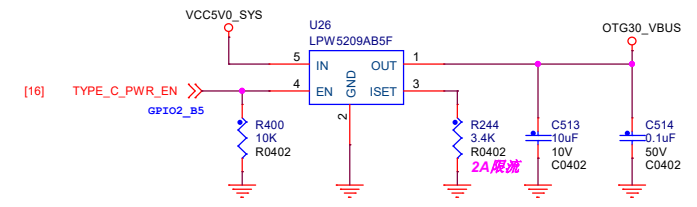
ESD



CC Handshake Chip

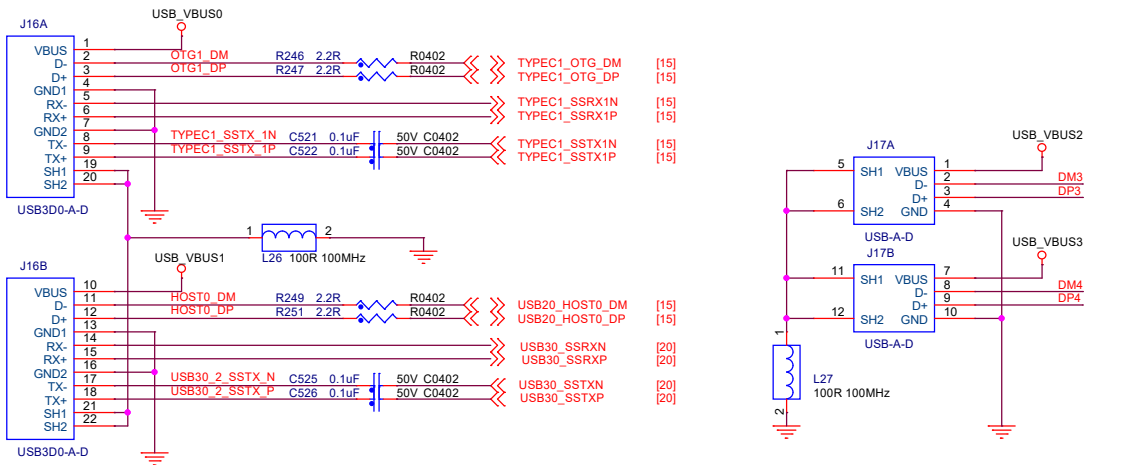


TYPE C Power

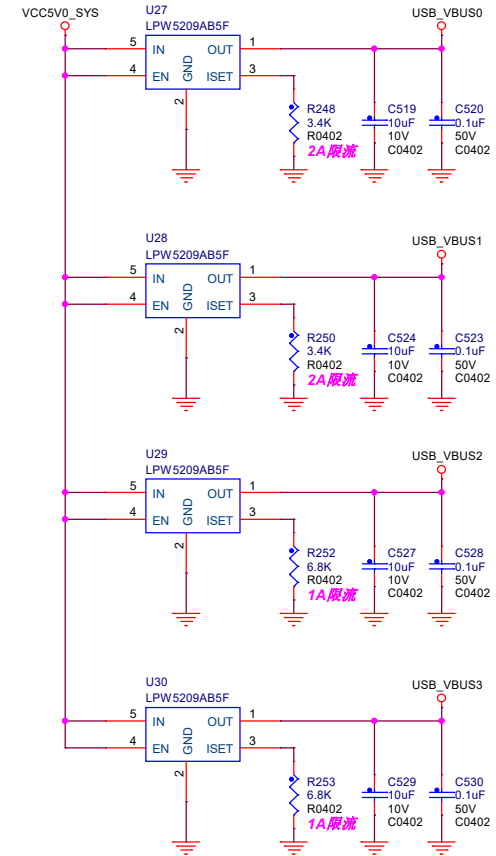


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USB 3.0 HOST x2 USB 2.0 HOST x2

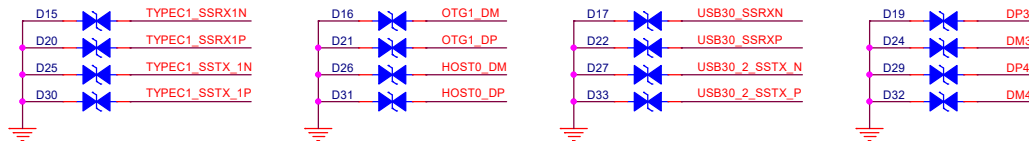


USB POWER

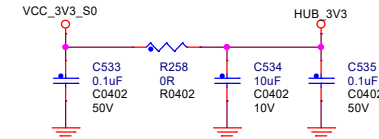
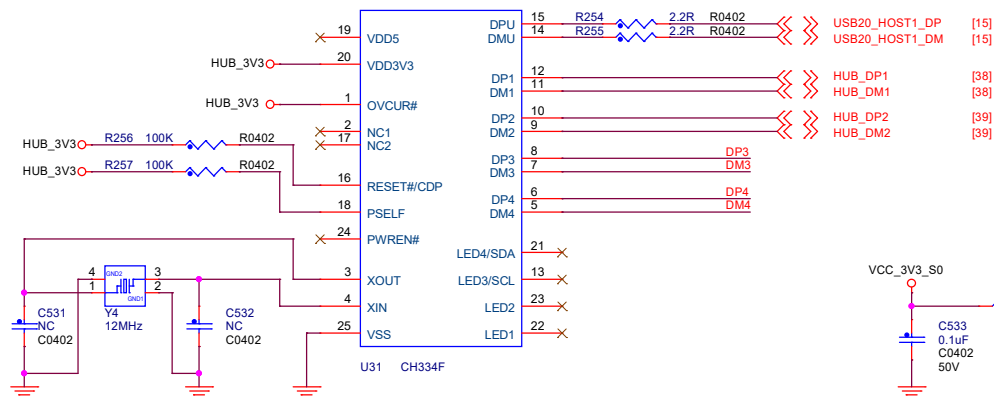


ESD

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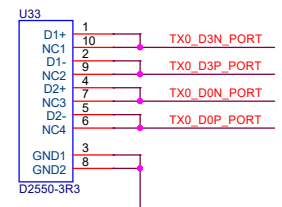
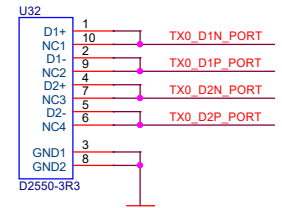
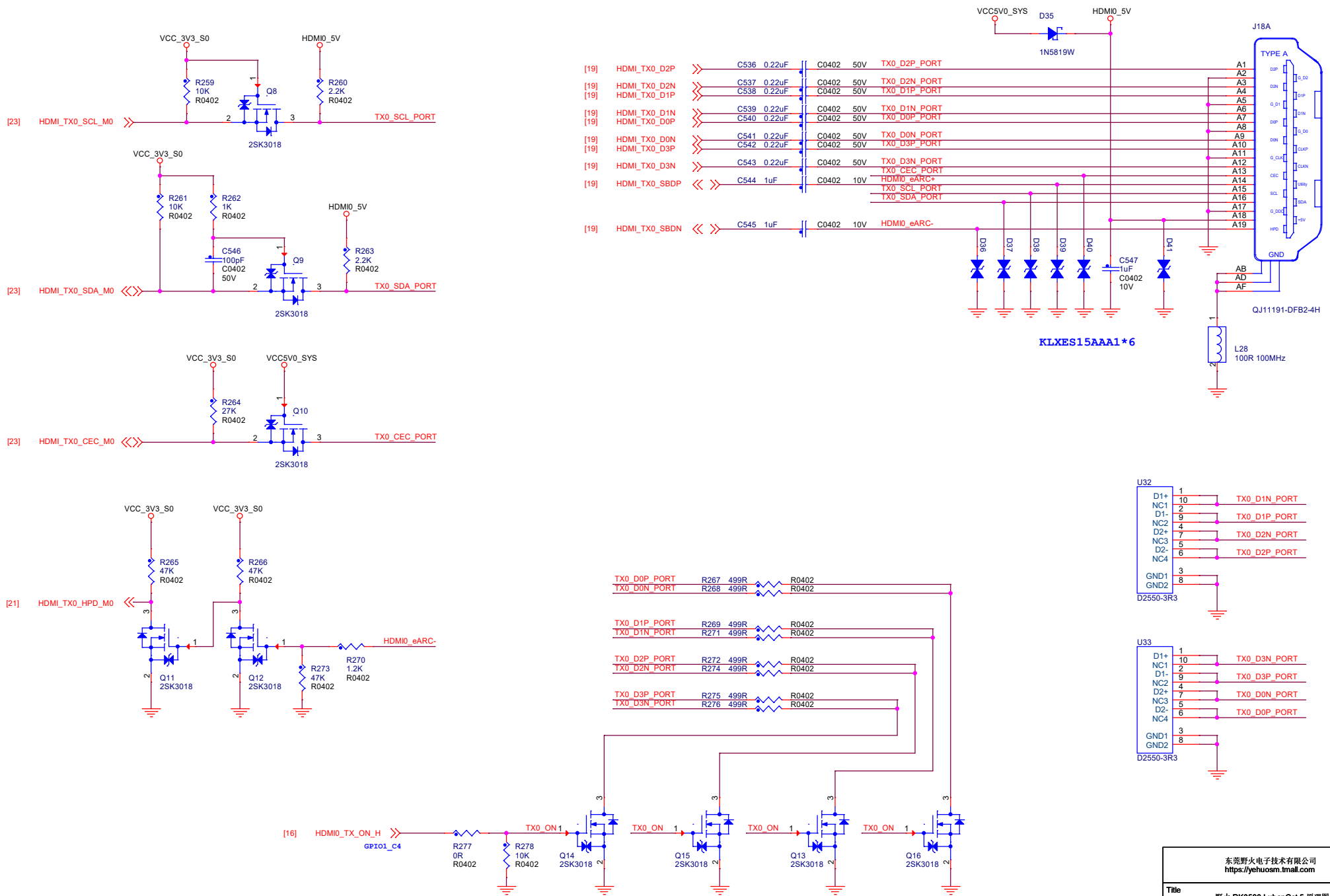


USB20 HUB PHY



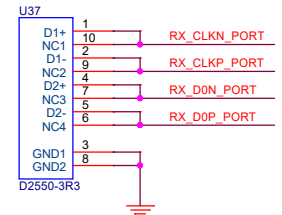
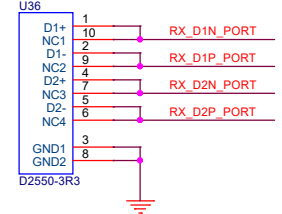
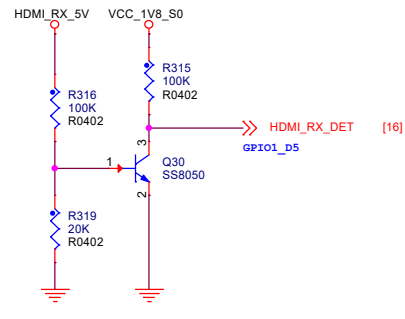
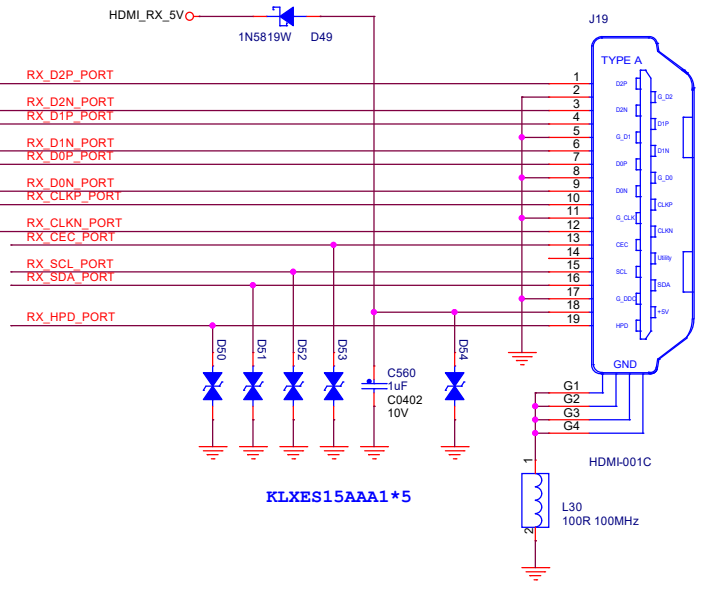
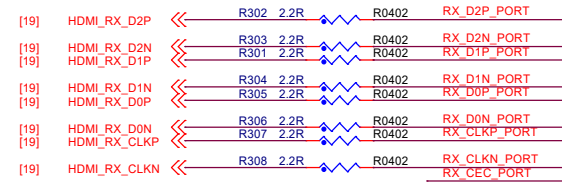
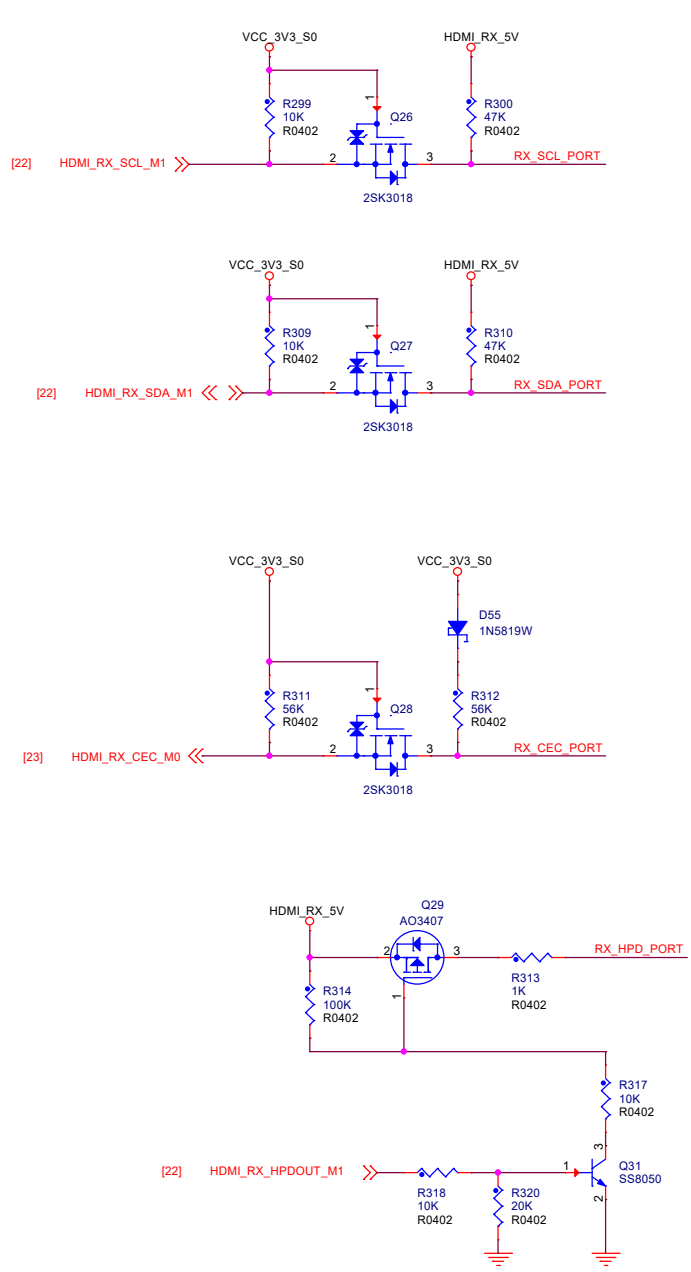
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Title 野火 RK3588 LubanCat 5 原理图		
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HDMI2.1 PORT



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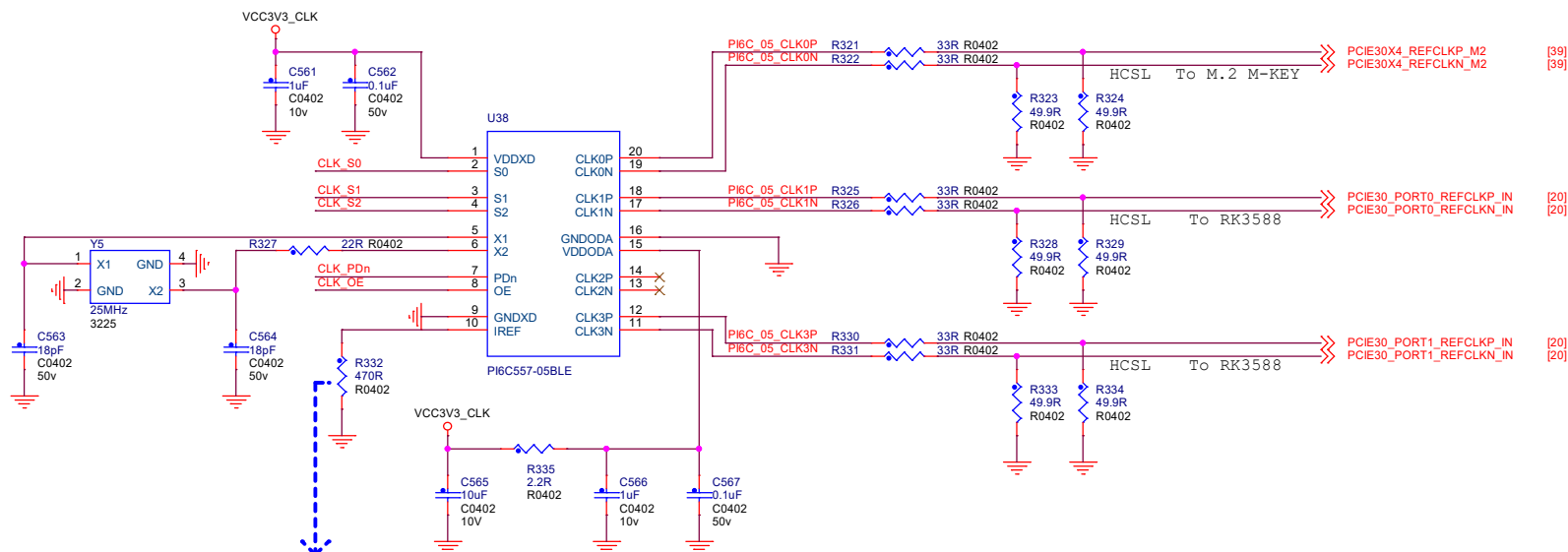
HDMI2.0 RX PORT



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PCIE3.0_REFCLK

CLK*3 @100MHz



If board target trace impedance is 50ohm then $R = 475\text{ohm}$ providing an IREF of 2.32 mA . The output current (IOH) is $6 * IREF$. $6 \times 2.32 \times 50 = 696\text{mV}$

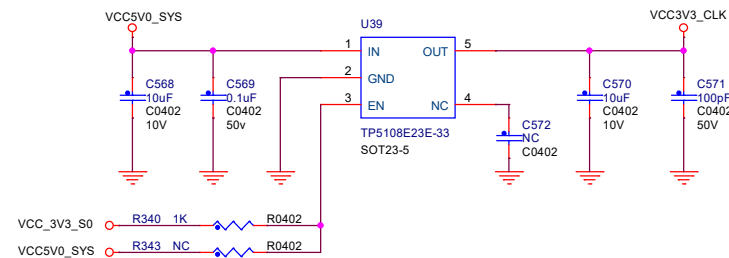


SPEED_MODE_SET

Default: No Spread

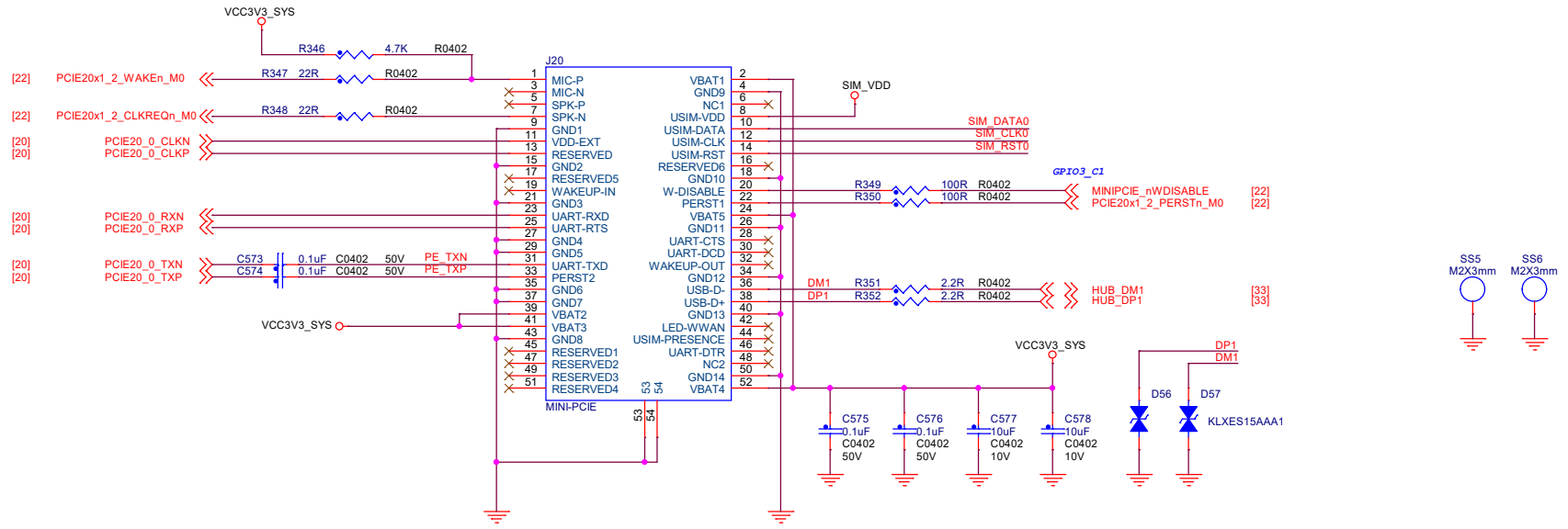
CLK_S0	CLK_S1	CLK_S2	Spread %	Out Freq
0	0	0	-0.5	100MHz
1	0	0	-1.0	100MHz
0	1	0	-1.5	100MHz
1	1	0	No Spread	100MHz

SPLIT_CLK_POWER

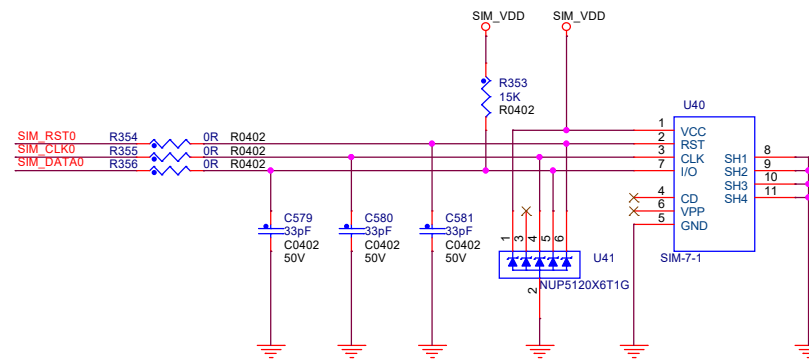


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MINI PCIE

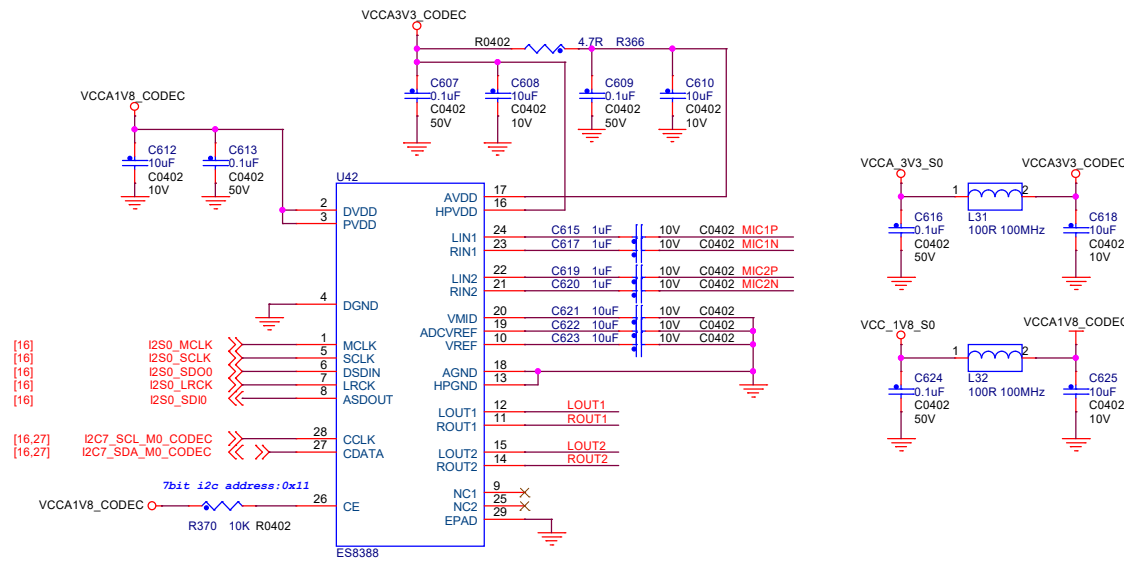


SIM CARD

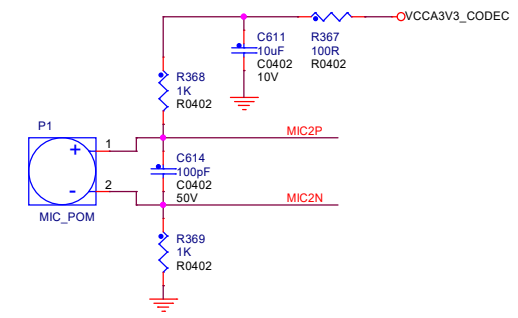


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Title 野火 RK3588 LubanCat 5 原理图		
Size A3	Document Number MINI_PCIE_PORT	Rev V2R0
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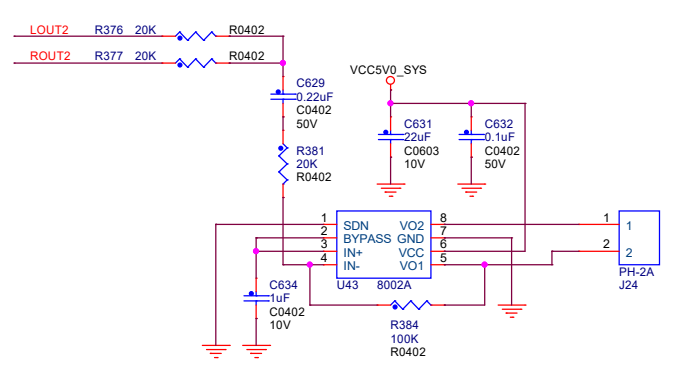
ES8388 CODEC



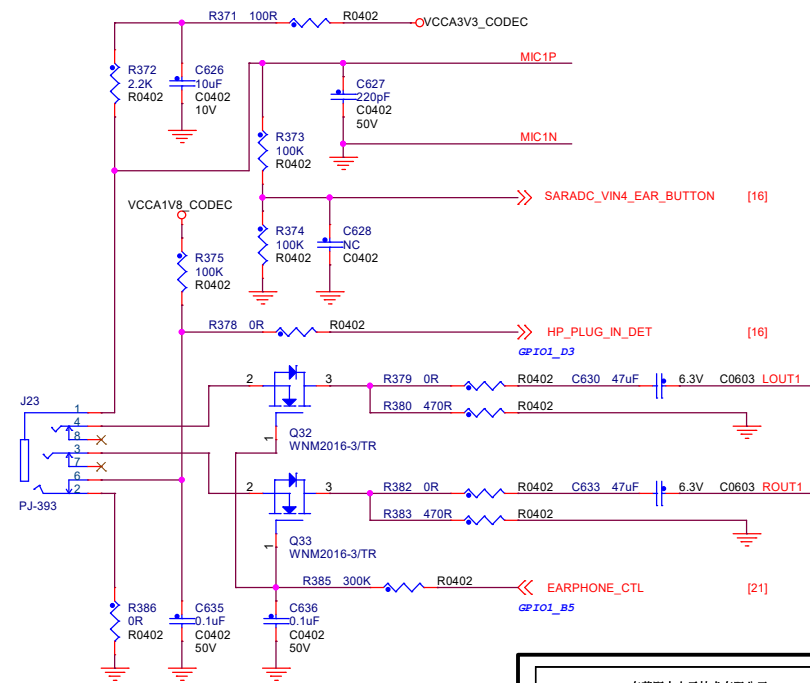
MIC



SPK

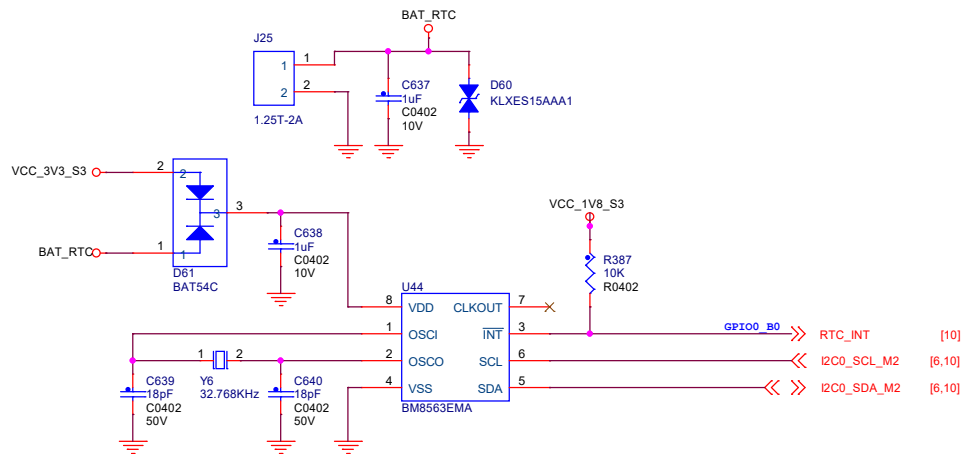


EarPhone

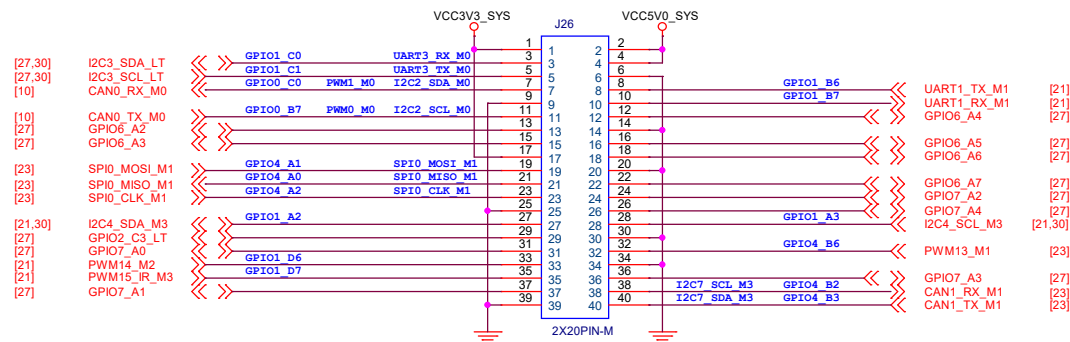


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Title: 野火 RK3588 LubanCat 5 原理图		
Size: A3	Document Number: CODEC/EarPhone/MIC/SPK	Rev: V2R0
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RTC

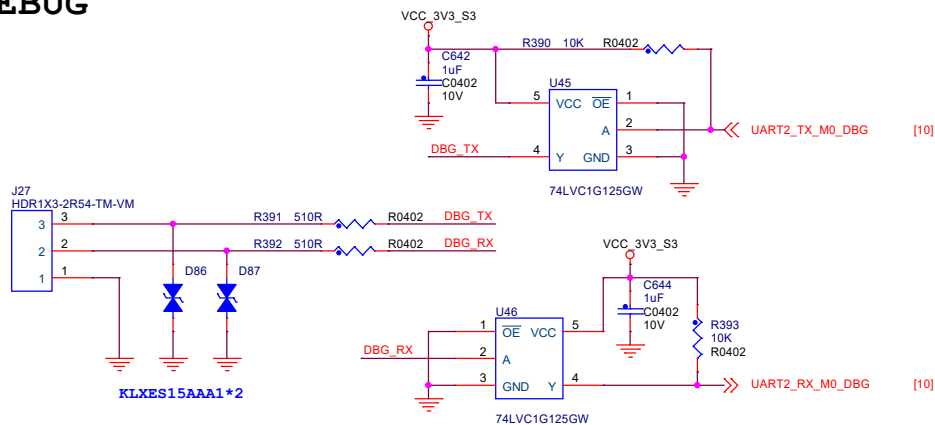


40Pin GPIO

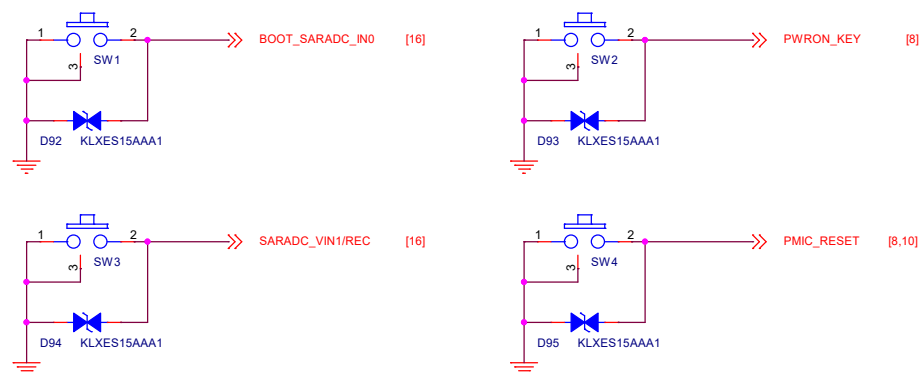


Only Support 3V3 I/O

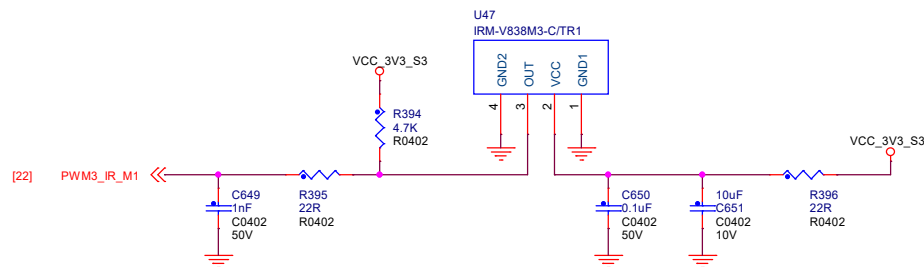
DEBUG



KEY



IR INPUT



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Title	野火 RK3588 LubanCat 5 原理图	
Size	Document Number	Rev
A3	32K_OSC/DEBUG/40P_IO/KEY	V2R0
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