RK3228A/RK3228B/RK3229

Content Indexing

PDF Number of pages

01.Index ------1
02.Change List ------2
03.Block Diagram ------3
04.Power tree-DiscretePower-option ------4
05.Power tree-RK805-1 ------5
06.System Power-DiscretePower-option ------6
07.System Power-RK805-1 ------7
08.RK322X Power ------8
09.RK322X OSC/PLL Power/eFUSE ------9
10.RK322X DDR Controler ------10
11.RK322X FLASH/eMMC Controler ------11
12.RK322X USB PHY ------12
13.RK322X SDMMC/I2C/I2S/GPIO ------13
14.RK322X HDMI PHY ------14
15.RK322X AV Interface ------15
16.RK322X Ethernet MAC/EmbedPHY/TS ------16
17.RAM DDR3 2x16bit ------17
18.RAM DDR3 4x16bit-option ------18
19.RAM DDR3 4x8bit-option ------19
21.TF/SD Card ------20
22.Flash Power Manage ------21
23.Flash-eMMC-Default ------22
24.Flash-Nand Flash-option ------23
25.USB Port ------24
26.HDMI OUT Port ------25
27.WIFI+BT ------26
28.S/PDIF Port ------27
29.AV OUT Port ------28
30.10/100M-Embed PHY ------29
32.10/100/1000M(Ext PHY)-option ------30
35.Debug UART2 ------31
36.WIFI-RTL8188FTV-option ------32
37.WIFI-RTL8189FTV-option ------33

Bill of Materials

Header:

Item\tPart\tDescription\tPCB Footprint\tReference\tQuantity\tOption

Combined property string:

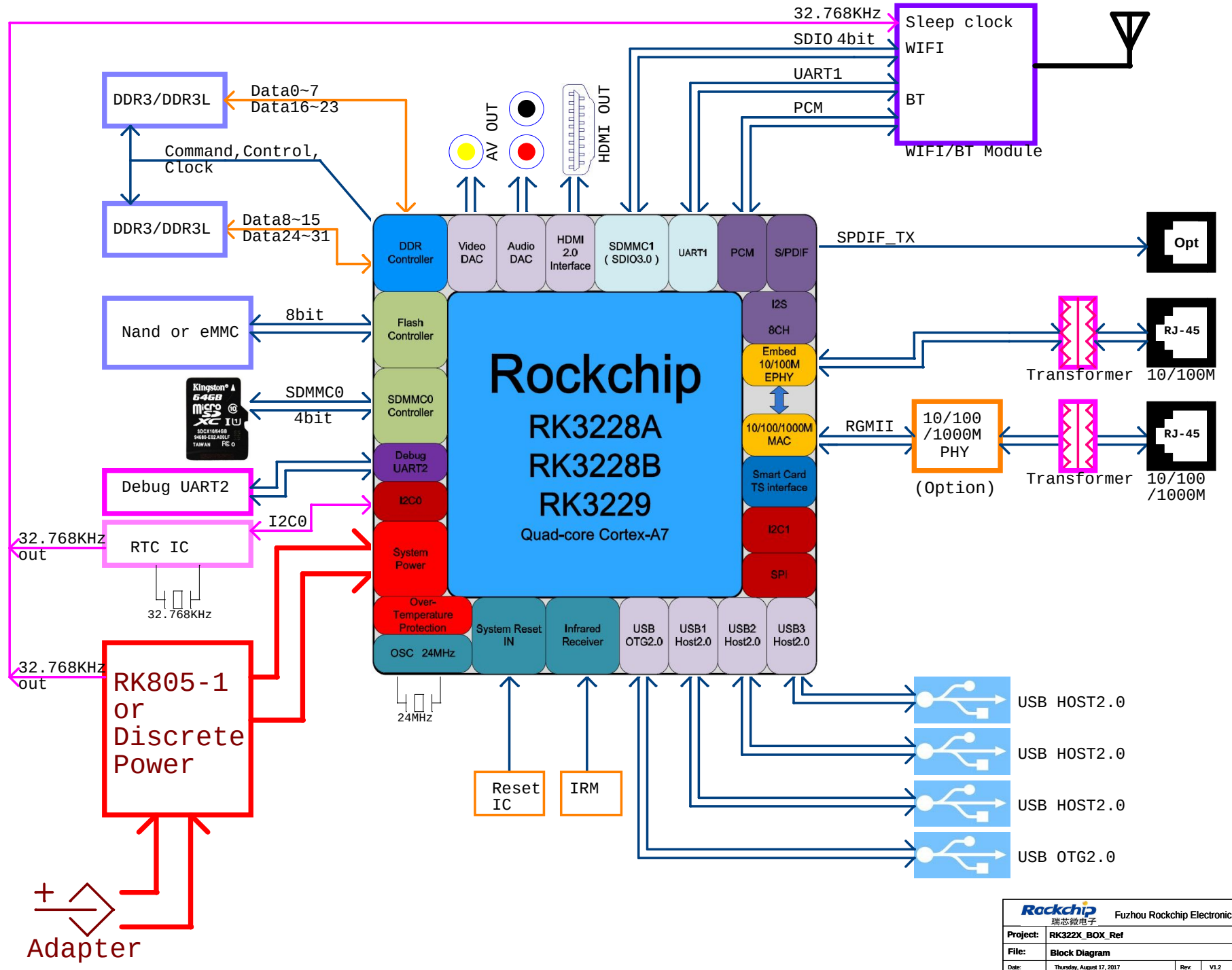
{Item}\t{Value}\t{Description}\t{PCB Footprint}\t{Reference}\t{Quantity}\t{Option}

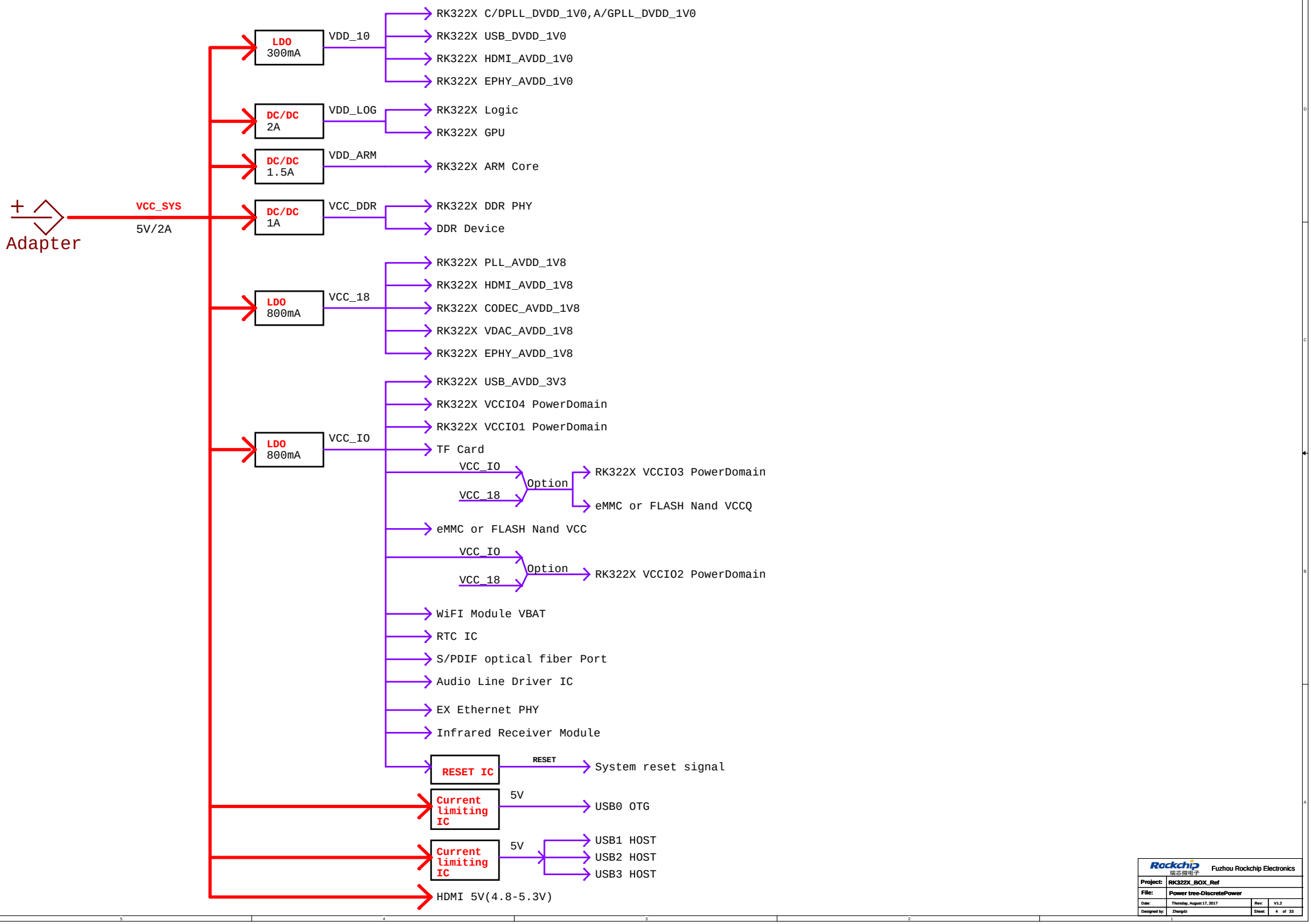
Note:
Component parameter description
1. DNP stands for component not mounted temporarily
2. If Value or option is DNP, which means the area is reserved without being mounted
3. If Flash is compatible, please notice
when eMMC is used, the option is that @eMMC is mounted, @Nand is not mounted
when Nand is used, the option is that @Nand is mounted, @eMMC is not mounted

Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	Index		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	1 of 33

Version	Date	Author	Change Note	Approved
V1.0	20160708	ZDZ	First edictor	
V1.1	20160801	ZDZ	1：U1400的输入电源网络名有误，原为悬空，现更新为VCC5V_HDMI	
V1.2	20170112	ZDZ	1：RK805-1 BUCK的电感感量由0.47uH更新为1uH	

Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	Change List		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	2 of 33

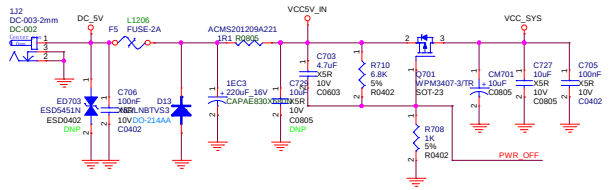

32.768KHz
Sleep clock
SDIO 4bit
WIFI
UART1
BT
PCM
WIFI/BT Module
DDR3/DDR3L
Data0~7
Data16~23
Command,Control,
Clock
DDR3/DDR3L
Data8~15
Data24~31
AV OUT
HDMI OUT
DDR Controller
Video DAC
Audio DAC
HDMI 2.0 Interface
SDMMC1 (SDIO3.0)
UART1
PCM
S/PDIF
SPDIF_TX
Opt
Nand or eMMC
8bit
Flash Controller
I2S 8CH
Embed 10/100M EPHY
RJ-45
Transformer
10/100M
SDMMC0
4bit
SDMMC0 Controller
Rockchip
RK3228A
RK3228B
RK3229
Quad-core Cortex-A7
10/100/1000M MAC
RGMII
10/100 /1000M PHY
(Option)
Transformer
RJ-45
10/100 /1000M
Debug UART2
Debug UART2
I2C0
I2C0
32.768KHz
out
RTC IC
32.768KHz
System Power
Smart Card TS interface
I2C1
SPI
Over-Temperature Protection
OSC 24MHz
System Reset IN
Infrared Receiver
USB OTG2.0
USB1 Host2.0
USB2 Host2.0
USB3 Host2.0
24MHz
32.768KHz
out
RK805-1
or
Discrete
Power
Reset IC
IRM
USB HOST2.0
USB HOST2.0
USB HOST2.0
USB OTG2.0
+
Adapter
Rockchip 瑞芯微电子
Fuzhou Rockchip Electronics
Project: RK322X_BOX_Ref
File: Block Diagram
Date: Thursday, August 17, 2017
Rev: V1.2
Designed by: Zhangdz
Sheet: 3 of 33



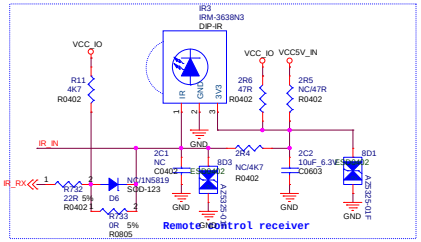
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics
Project:	RK322X_BOX_Ref
File:	Power tree-DiscretePower
Date:	Thursday, August 17, 2017
Rev:	V1.2
Designed by:	Zhangqx
Sheet:	4 of 33

DC IN

Note:
Adapter recommend 5.2V/2A.
External diameter: 3.5mm,
Inside diameter: 1.35mm

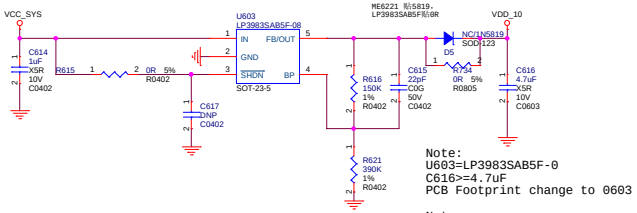


IR Receiver



VDD_10

Note:
LAYOUT时，必须走星形。

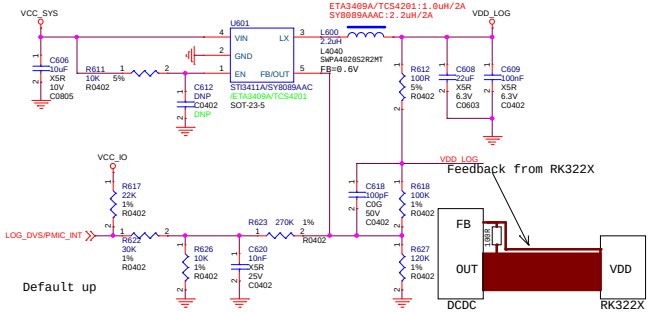


Note:
U603=LP3983SAB5F-0
C616>=4.7uF
PCB Footprint change to 0603

Note:
CE8806B FB=0.6V

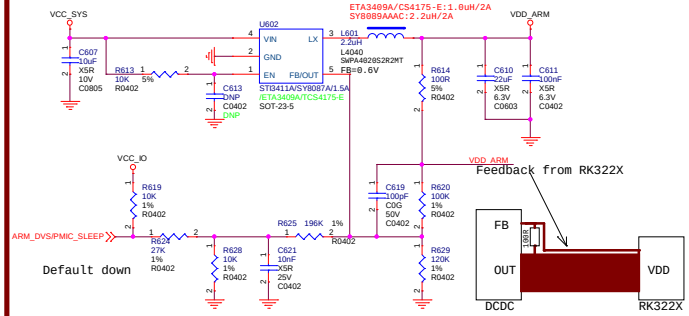
VDD_LOG Max:2A

V=Vmax-(Vmax-Vmin)*Duty
Default 1.1V
1.018-1.316V

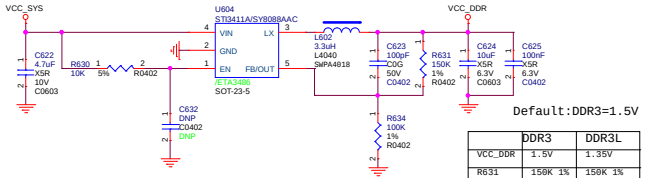


VDD_ARM:Max 1.5A

V=Vmax-(Vmax-Vmin)*Duty
Default 1.097V
0.954-1.395V



VCC_DDR

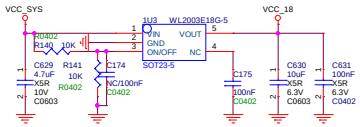


Default:DDR3=1.5V

	DDR3	DDR3L
VCC_DDR	1.5V	1.35V
R631	150K 1%	150K 1%
R634	100K 1%	120K 1%

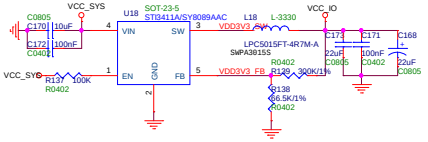
VCC_18

Note:
LAYOUT时，必须走星形。

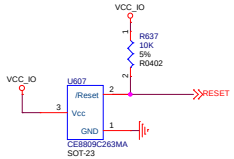


VCC_IO

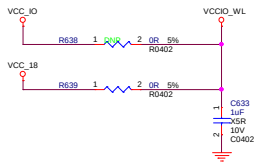
Default 3.3V



RESET IC



VCCIO_WL

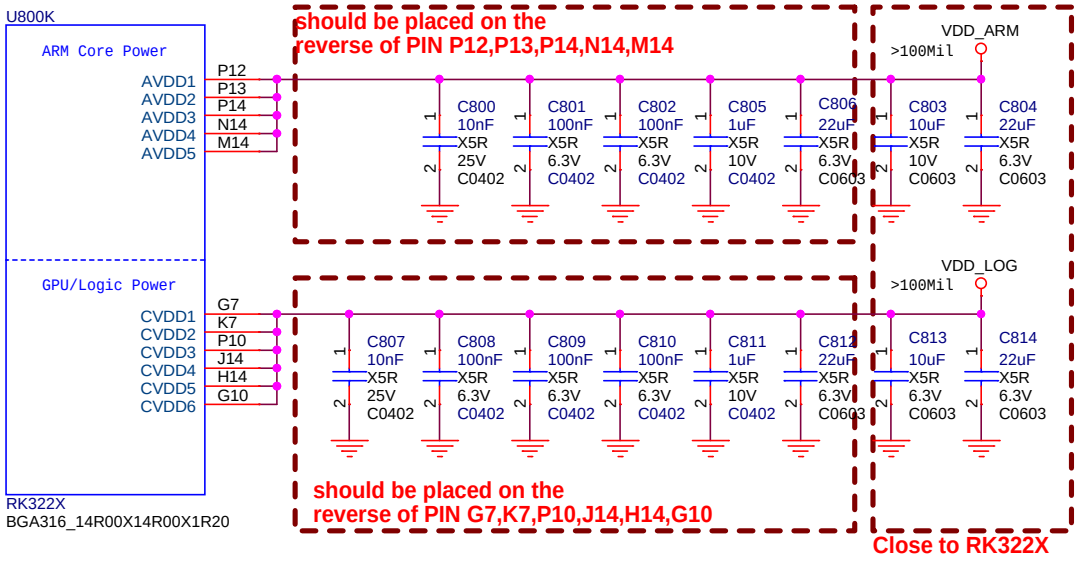


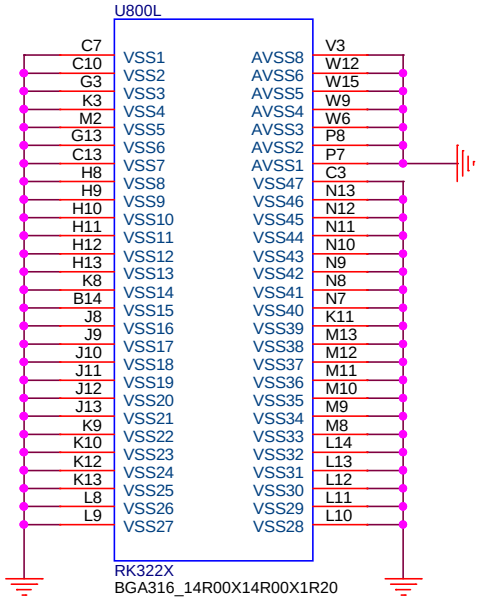
Default:SDIO3.0

SDIO2.0/3.0	SDIO2.0	SDIO3.0
VCCIO_WL	3.3V	1.8V
R638	0R	DNP
R639	DNP	0R

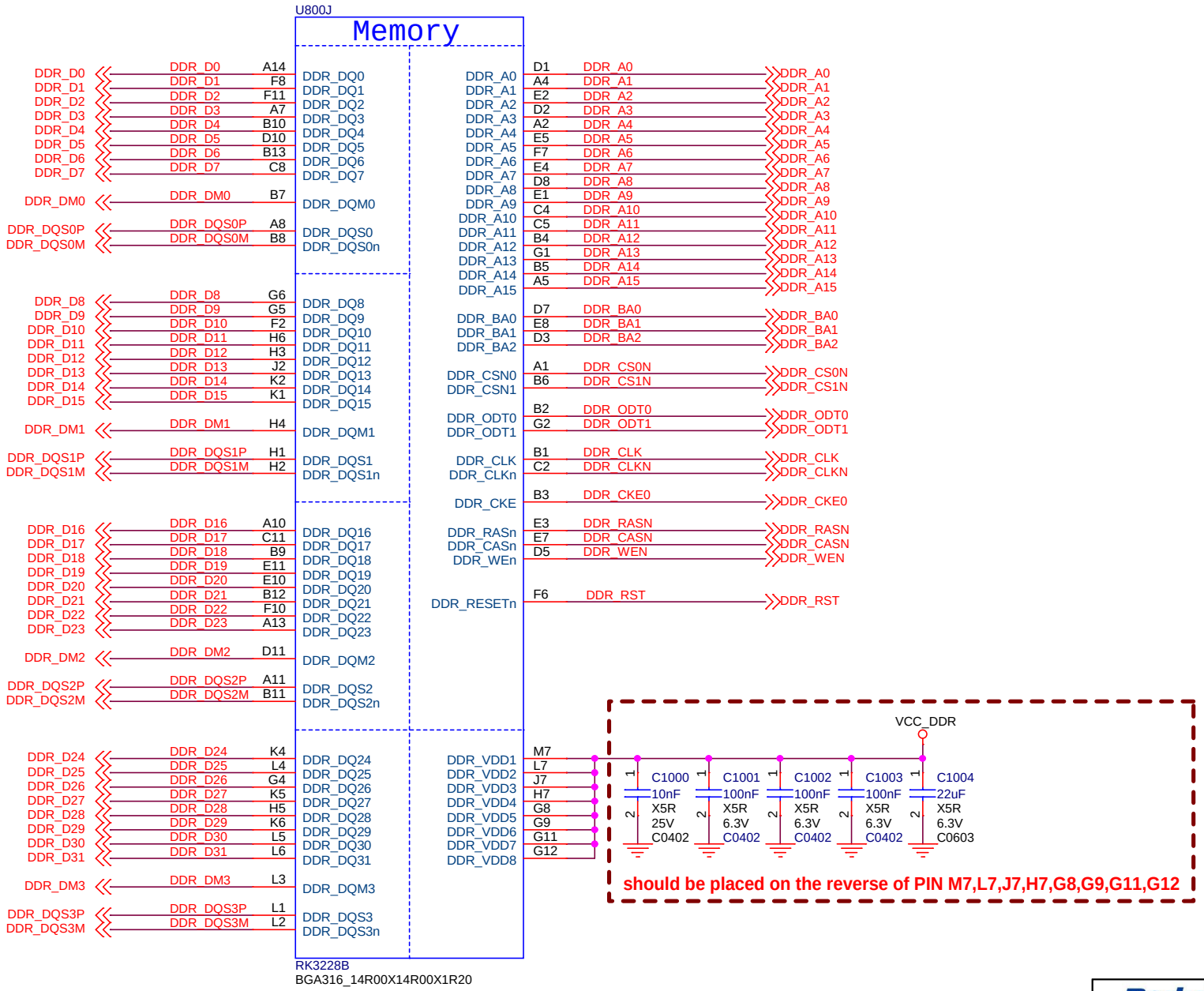
M600 MARK MARK
M601 MARK MARK
M602 MARK MARK
M603 MARK MARK
M604 MARK MARK
M605 MARK MARK

Fuzhou Rockchip Electronics	
Project:	RK322X_BOX_Ref
File:	System Power-DiscretePower-option
Date:	Thursday, August 17, 2017
Rev:	V1.2
Designed by:	Zhangqz
Sheet:	6 of 33

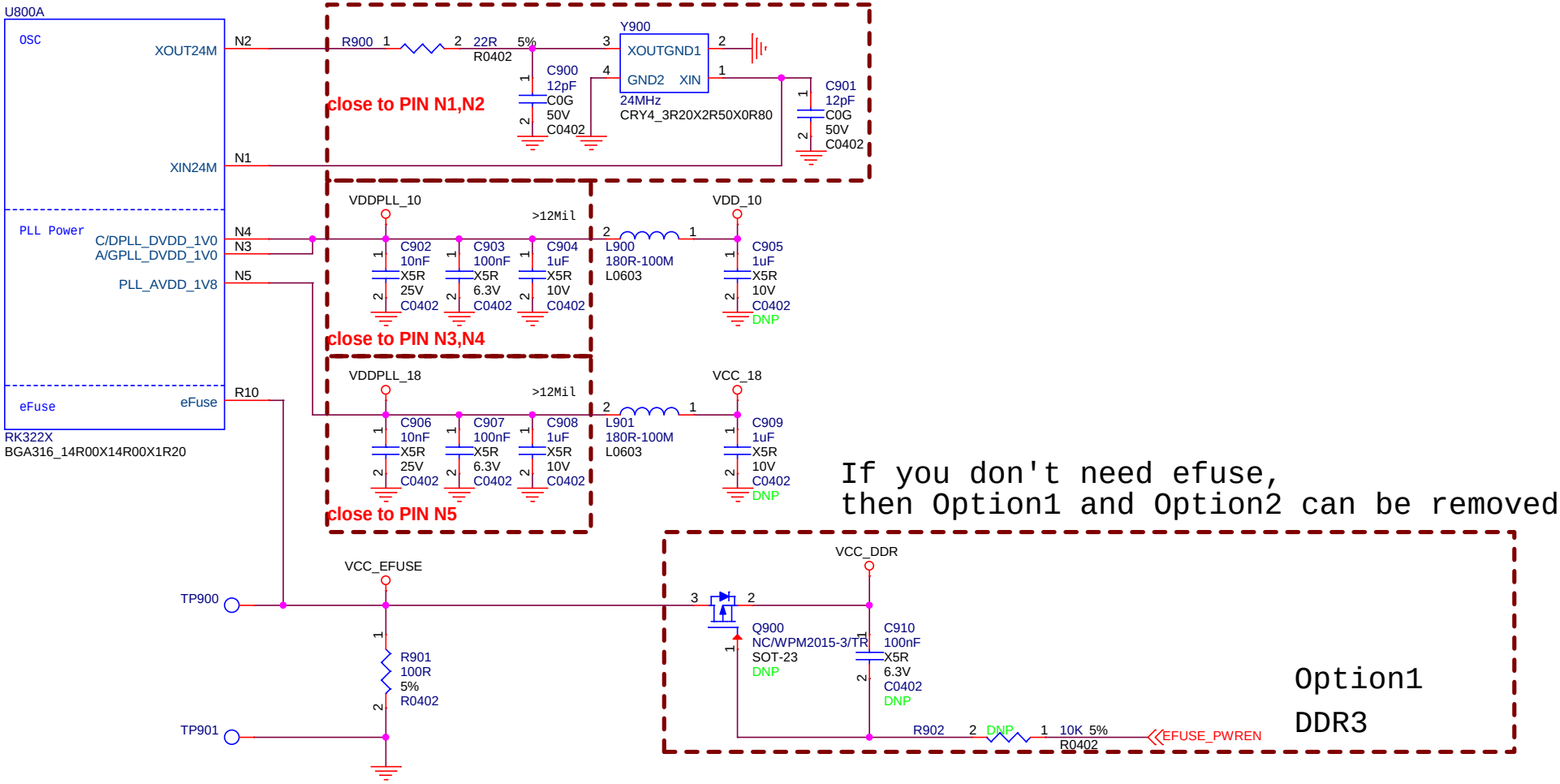




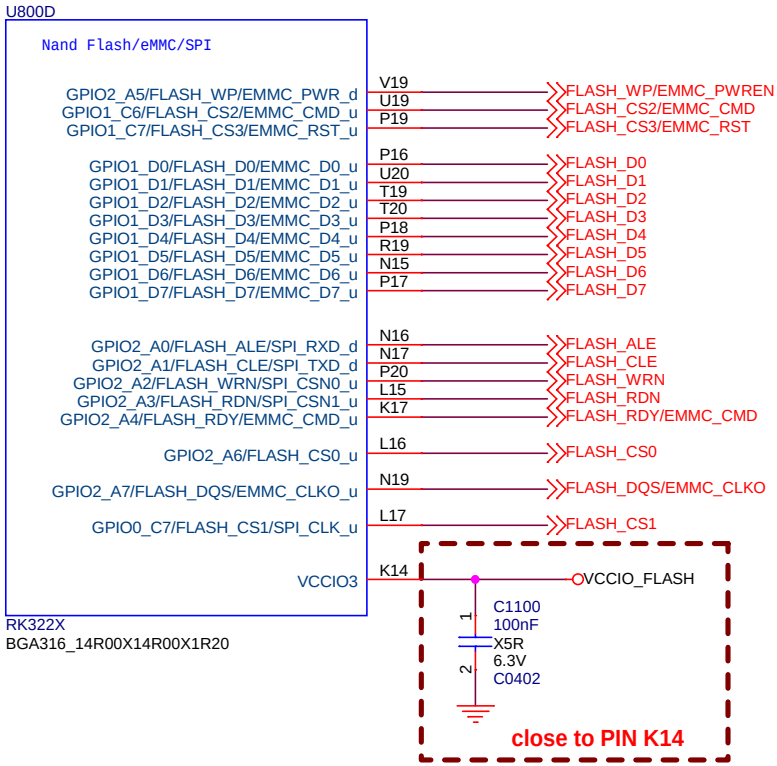
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK322X Power		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	8 of 33



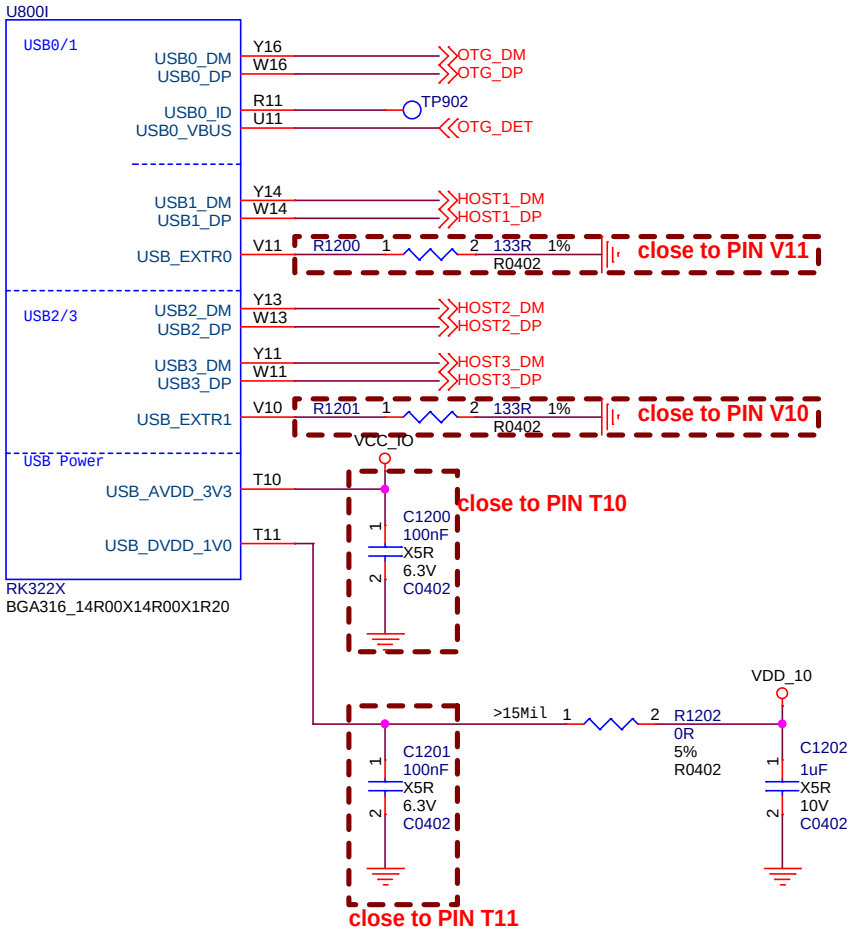
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK3228B DDR Controler		
Date:	Thursday, August 17, 2017	Rev:	V1.0
Designed by:	Zhangdz	Sheet:	8 of 28



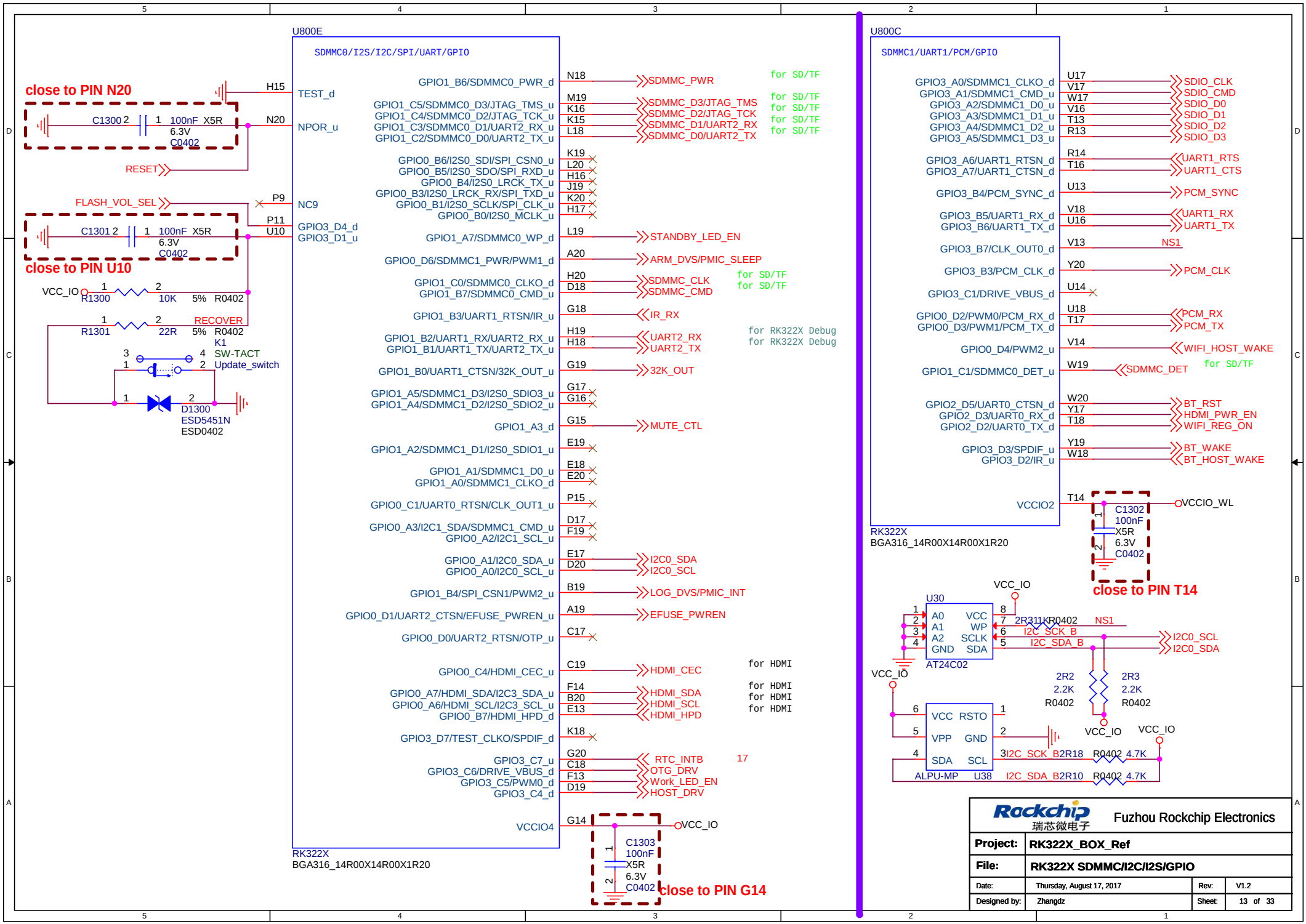
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK322X OSC/PLL Power/eFUSE		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	9 of 33

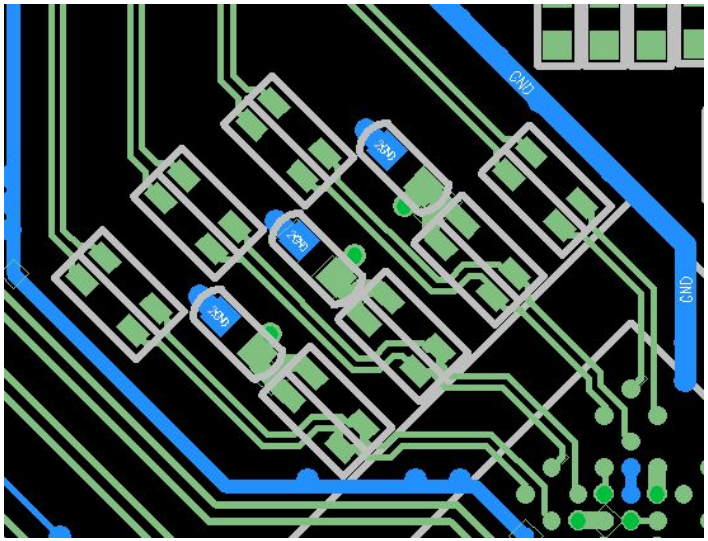


Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	**RK322X_BOX_Ref**		
File:	**RK322X FLASH/eMMC Controler**		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	11 of 33

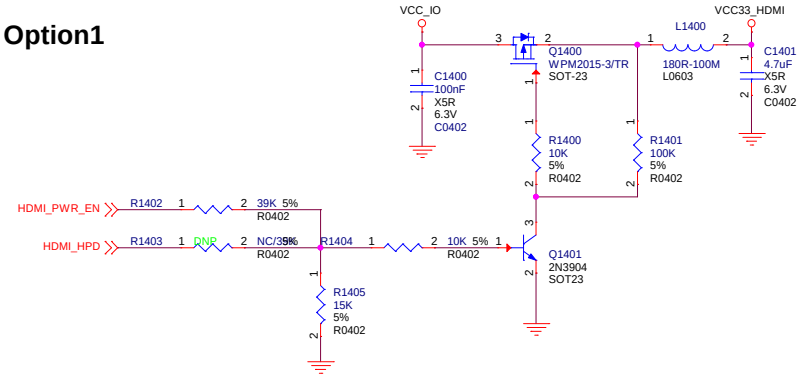


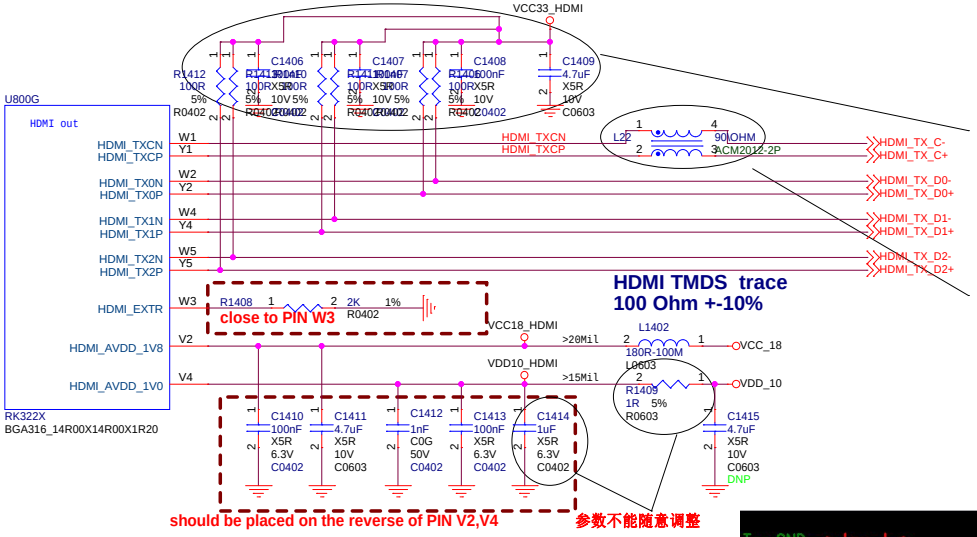
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK322X USB PHY		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	12 of 33


U800E
SDMMC0/I2S/I2C/SPI/UART/GPIO
close to PIN N20
H15
TEST_d
C1300 2
1
100nF X5R
6.3V
C0402
N20
NPOR_u
RESET
FLASH_VOL_SEL
P9
NC9
P11
U10
GPIO3_D4_d
GPIO3_D1_u
C1301 2
1
100nF X5R
6.3V
C0402
close to PIN U10
VCC_IO
1
R1300
2
10K 5% R0402
1
R1301
2
22R 5% R0402
RECOVER
K1
3
1
4
2
SW-TACT
Update_switch
1
2
D1300
ESD5451N
ESD0402
GPIO1_B6/SDMMC0_PWR_d
N18
SDMMC_PWR
for SD/TF
GPIO1_C5/SDMMC0_D3/JTAG_TMS_u
GPIO1_C4/SDMMC0_D2/JTAG_TCK_u
GPIO1_C3/SDMMC0_D1/UART2_RX_u
GPIO1_C2/SDMMC0_D0/UART2_TX_u
M19
K16
K15
L18
SDMMC_D3/JTAG_TMS
SDMMC_D2/JTAG_TCK
SDMMC_D1/UART2_RX
SDMMC_D0/UART2_TX
for SD/TF
for SD/TF
for SD/TF
for SD/TF
GPIO0_B6/I2S0_SDI/SPI_CSN0_u
GPIO0_B5/I2S0_SDO/SPI_RXD_u
GPIO0_B4/I2S0_LRCK_TX_u
GPIO0_B3/I2S0_LRCK_RX/SPI_TXD_u
GPIO0_B1/I2S0_SCLK/SPI_CLK_u
GPIO0_B0/I2S0_MCLK_u
K19
L20
H16
J19
K20
H17
GPIO1_A7/SDMMC0_WP_d
L19
STANDBY_LED_EN
GPIO0_D6/SDMMC1_PWR/PWM1_d
A20
ARM_DVS/PMIC_SLEEP
GPIO1_C0/SDMMC0_CLKO_d
GPIO1_B7/SDMMC0_CMD_u
H20
D18
SDMMC_CLK
SDMMC_CMD
for SD/TF
for SD/TF
GPIO1_B3/UART1_RTSN/IR_u
G18
IR_RX
GPIO1_B2/UART1_RX/UART2_RX_u
GPIO1_B1/UART1_TX/UART2_TX_u
H19
H18
UART2_RX
UART2_TX
for RK322X Debug
for RK322X Debug
GPIO1_B0/UART1_CTSN/32K_OUT_u
G19
32K_OUT
GPIO1_A5/SDMMC1_D3/I2S0_SDIO3_u
GPIO1_A4/SDMMC1_D2/I2S0_SDIO2_u
G17
G16
GPIO1_A3_d
G15
MUTE_CTL
GPIO1_A2/SDMMC1_D1/I2S0_SDIO1_u
E19
GPIO1_A1/SDMMC1_D0_u
GPIO1_A0/SDMMC1_CLKO_d
E18
E20
GPIO0_C1/UART0_RTSN/CLK_OUT1_u
P15
GPIO0_A3/I2C1_SDA/SDMMC1_CMD_u
GPIO0_A2/I2C1_SCL_u
D17
F19
GPIO0_A1/I2C0_SDA_u
GPIO0_A0/I2C0_SCL_u
E17
D20
I2C0_SDA
I2C0_SCL
GPIO1_B4/SPI_CSN1/PWM2_u
B19
LOG_DVS/PMIC_INT
GPIO0_D1/UART2_CTSN/EFUSE_PWREN_u
A19
EFUSE_PWREN
GPIO0_D0/UART2_RTSN/OTP_u
C17
GPIO0_C4/HDMI_CEC_u
C19
HDMI_CEC
for HDMI
GPIO0_A7/HDMI_SDA/I2C3_SDA_u
GPIO0_A6/HDMI_SCL/I2C3_SCL_u
GPIO0_B7/HDMI_HPD_d
F14
B20
E13
HDMI_SDA
HDMI_SCL
HDMI_HPD
for HDMI
for HDMI
for HDMI
GPIO3_D7/TEST_CLKO/SPDIF_d
K18
GPIO3_C7_u
GPIO3_C6/DRIVE_VBUS_d
GPIO3_C5/PWM0_d
GPIO3_C4_d
G20
C18
F13
D19
RTC_INTB
OTG_DRV
Work_LED_EN
HOST_DRV
17
VCCIO4
G14
VCC_IO
C1303
100nF
X5R
6.3V
C0402
close to PIN G14
RK322X
BGA316_14R00X14R00X1R20
U800C
SDMMC1/UART1/PCM/GPIO
GPIO3_A0/SDMMC1_CLKO_d
GPIO3_A1/SDMMC1_CMD_u
GPIO3_A2/SDMMC1_D0_u
GPIO3_A3/SDMMC1_D1_u
GPIO3_A4/SDMMC1_D2_u
GPIO3_A5/SDMMC1_D3_u
U17
V17
W17
V16
T13
R13
SDIO_CLK
SDIO_CMD
SDIO_D0
SDIO_D1
SDIO_D2
SDIO_D3
GPIO3_A6/UART1_RTSN_d
GPIO3_A7/UART1_CTSN_d
R14
T16
UART1_RTS
UART1_CTS
GPIO3_B4/PCM_SYNC_d
U13
PCM_SYNC
GPIO3_B5/UART1_RX_d
GPIO3_B6/UART1_TX_d
V18
U16
UART1_RX
UART1_TX
GPIO3_B7/CLK_OUT0_d
V13
NS1
GPIO3_B3/PCM_CLK_d
Y20
PCM_CLK
GPIO3_C1/DRIVE_VBUS_d
U14
GPIO0_D2/PWM0/PCM_RX_d
GPIO0_D3/PWM1/PCM_TX_d
U18
T17
PCM_RX
PCM_TX
GPIO0_D4/PWM2_u
V14
WIFI_HOST_WAKE
GPIO1_C1/SDMMC0_DET_u
W19
SDMMC_DET
for SD/TF
GPIO2_D5/UART0_CTSN_d
GPIO2_D3/UART0_RX_d
GPIO2_D2/UART0_TX_d
W20
Y17
T18
BT_RST
HDMI_PWR_EN
WIFI_REG_ON
GPIO3_D3/SPDIF_u
GPIO3_D2/IR_u
Y19
W18
BT_WAKE
BT_HOST_WAKE
VCCIO2
T14
VCCIO_WL
C1302
100nF
X5R
6.3V
C0402
close to PIN T14
RK322X
BGA316_14R00X14R00X1R20
VCC_IO
U30
A0
A1
A2
GND
VCC
WP
SCLK
SDA
AT24C02
2R311KR0402
NS1
I2C_SCK_B
I2C_SDA_B
I2C0_SCL
I2C0_SDA
VCC_IO
2R2
2.2K
R0402
2R3
2.2K
R0402
VCC_IO
VCC_IO
VCC
RSTO
VPP
GND
SDA
SCL
ALPU-MP
U38
I2C_SCK_B
2R18
R0402 4.7K
I2C_SDA_B
2R10
R0402 4.7K
Rockchip
瑞芯微电子
Fuzhou Rockchip Electronics
Project:
RK322X_BOX_Ref
File:
RK322X SDMMC/I2C/I2S/GPIO
Date:
Thursday, August 17, 2017
Rev:
V1.2
Designed by:
Zhangdz
Sheet:
13 of 33



Option1



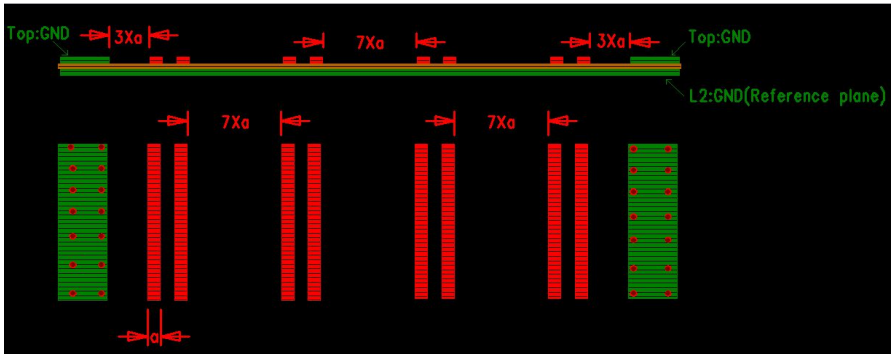


Note:
1:pull up resistance close to PIN W2/Y2,W4/Y4,W/Y5
2:100nF capacitance close to resistance
3:pull up resistance PCB Footprint must use less than 0402

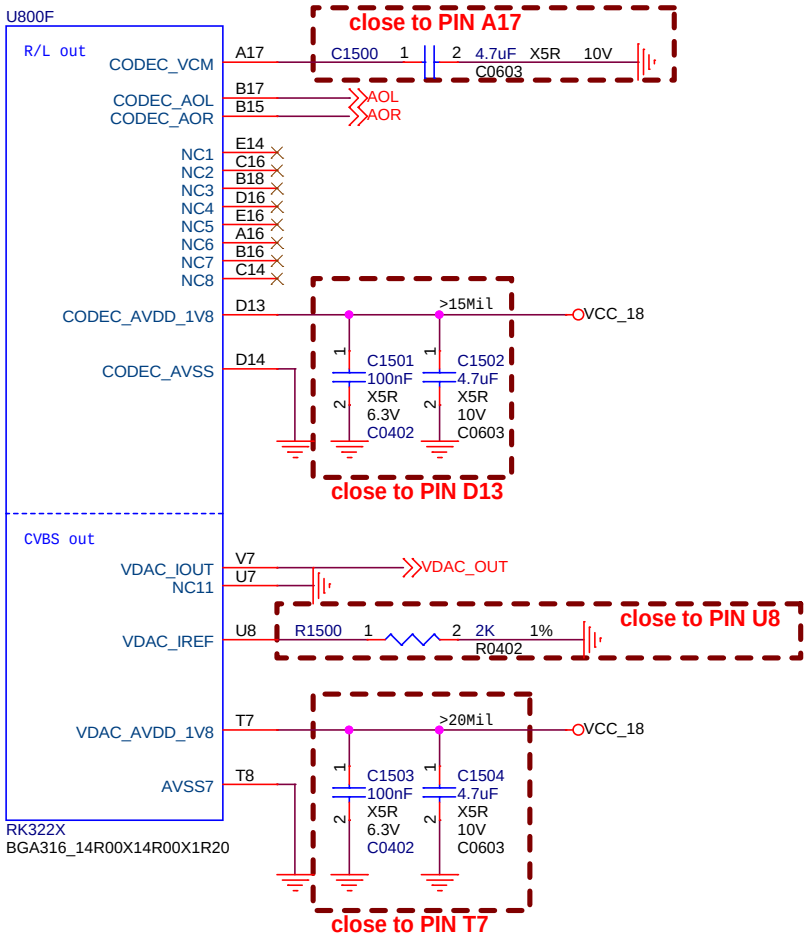
Note:
PCB Footprint must use less than 0402
MCZ1210,

HDMI2.0

Note:
Layout must according to the rules

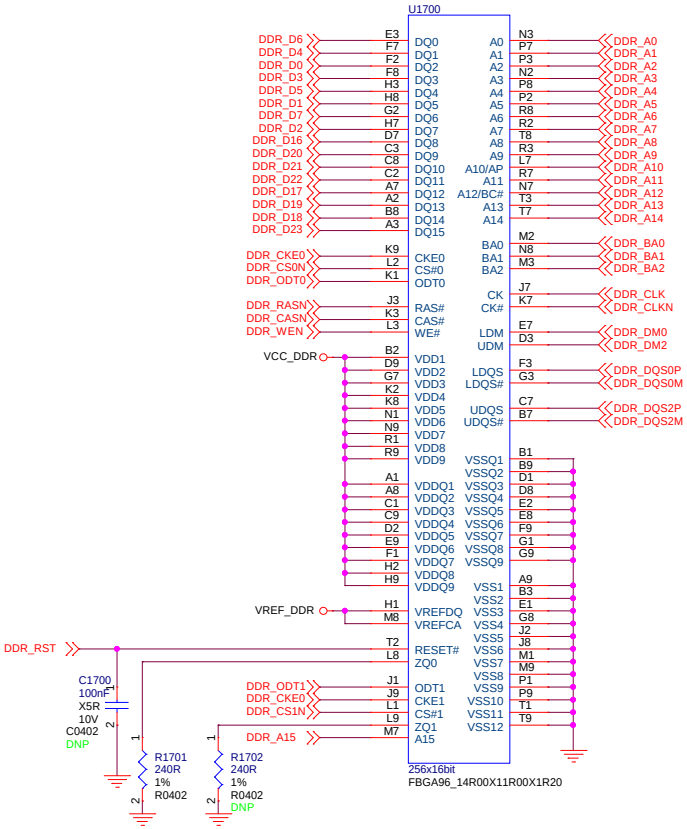


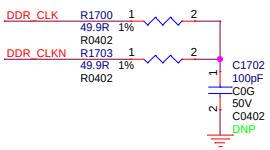
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK322X HDMI PHY		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	14 of 33

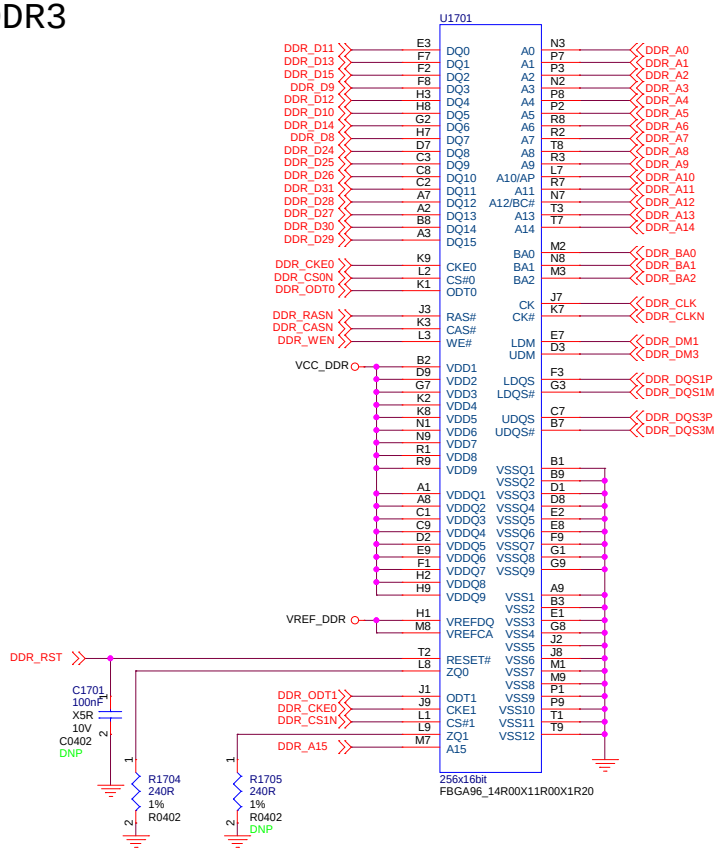


Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK322X AV Interface		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	15 of 33

2X16bit DDR3

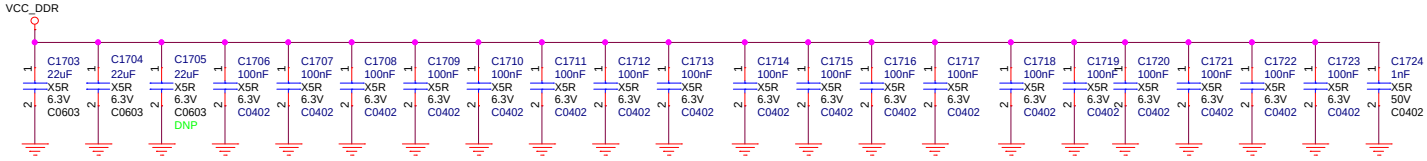


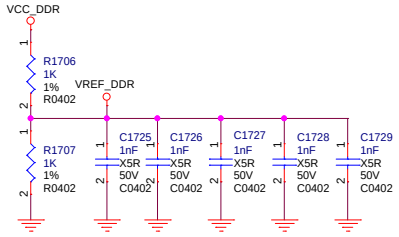




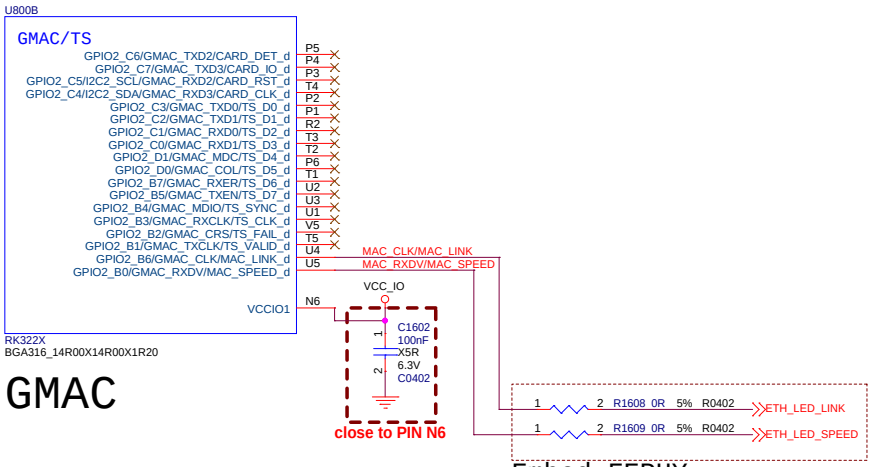
Note: Speed > DDR3-1600Mb/s
4 layer board

DDR3 FILTER





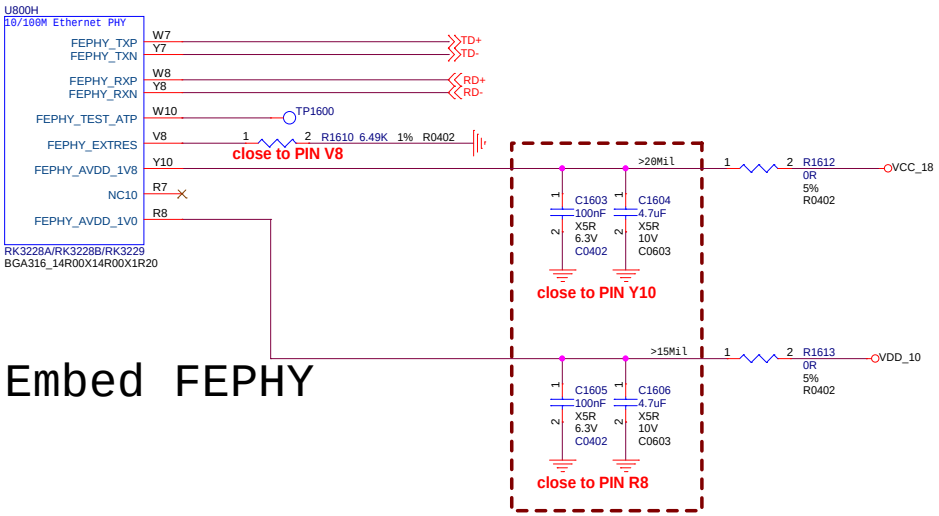
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RAM DDR3 2x16bit		
Date:	Thursday, August 17, 2017	Rev:	V1.0
Designed by:	Zhangdz	Sheet:	15 of 28



GMAC

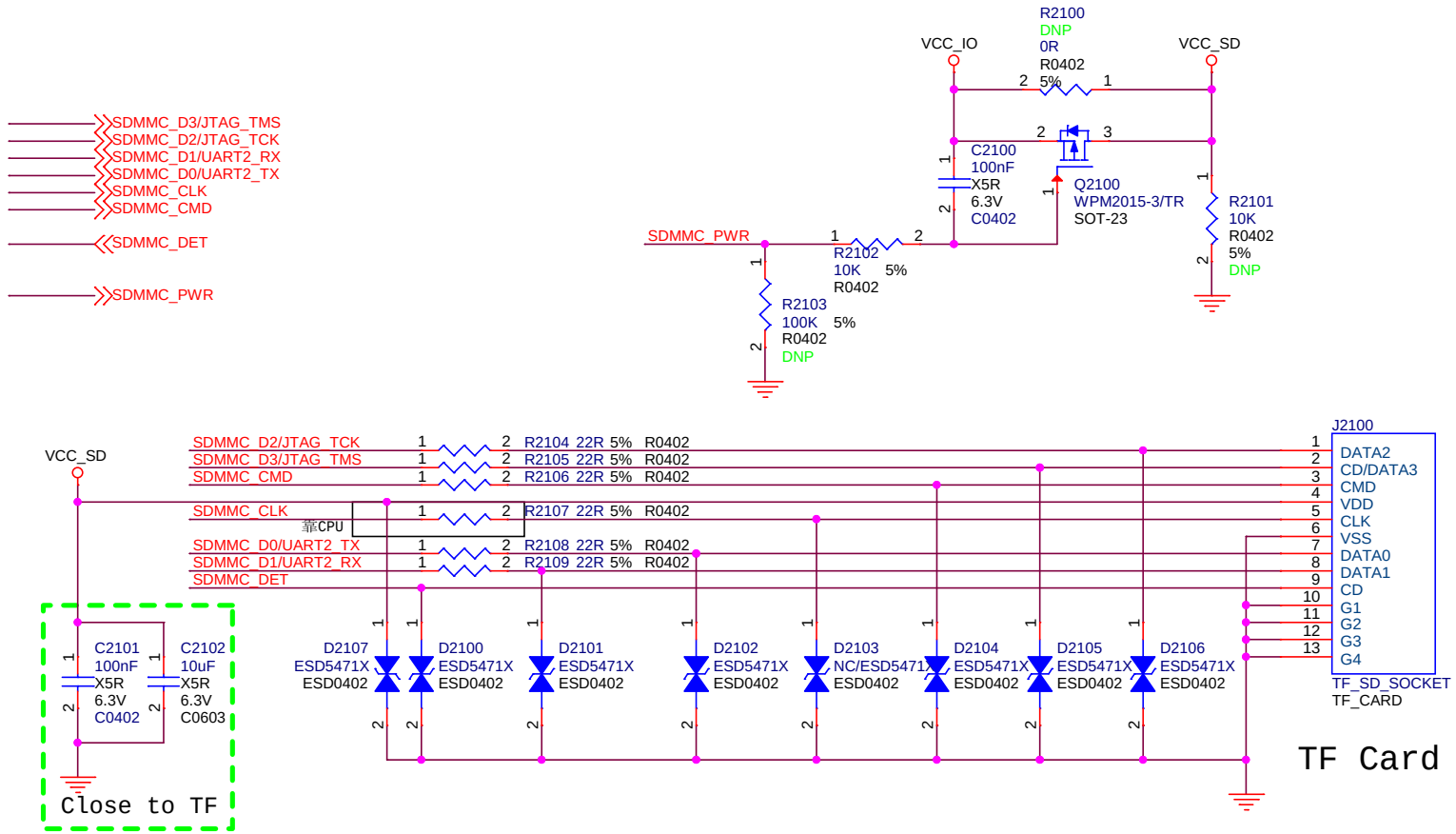
Embed FEPHY
LED state control

10/100M/1000M RGMII Interface	
MAC_TXD0	PHY_TXD0
MAC_TXD1	PHY_TXD1
MAC_TXD2	PHY_TXD2
MAC_TXD3	PHY_TXD3
MAC_TXEN	PHY_TXEN
MAC_TXCLK	PHY_TXCLK
MAC_RXD0	PHY_RXD0
MAC_RXD1	PHY_RXD1
MAC_RXD2	PHY_RXD2
MAC_RXD3	PHY_RXD3
MAC_RXDV	PHY_RXDV
MAC_RXCLK	PHY_RXCLK
MAC_CLK	PHY_CLKOUT125
MAC_MDIO	PHY_MDIO
MAC_MDC	PHY_MDC
PHY_RST	PHY_RST

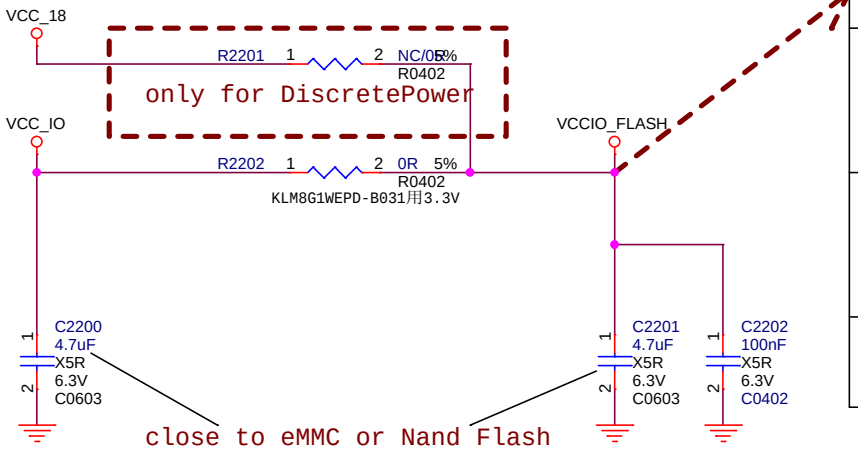


Embed FEPHY

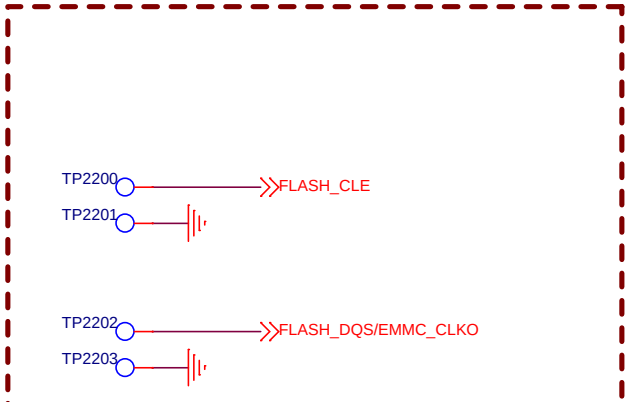
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RK322X Ethernet MAC/EmbedPHY/TS		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	16 of 33

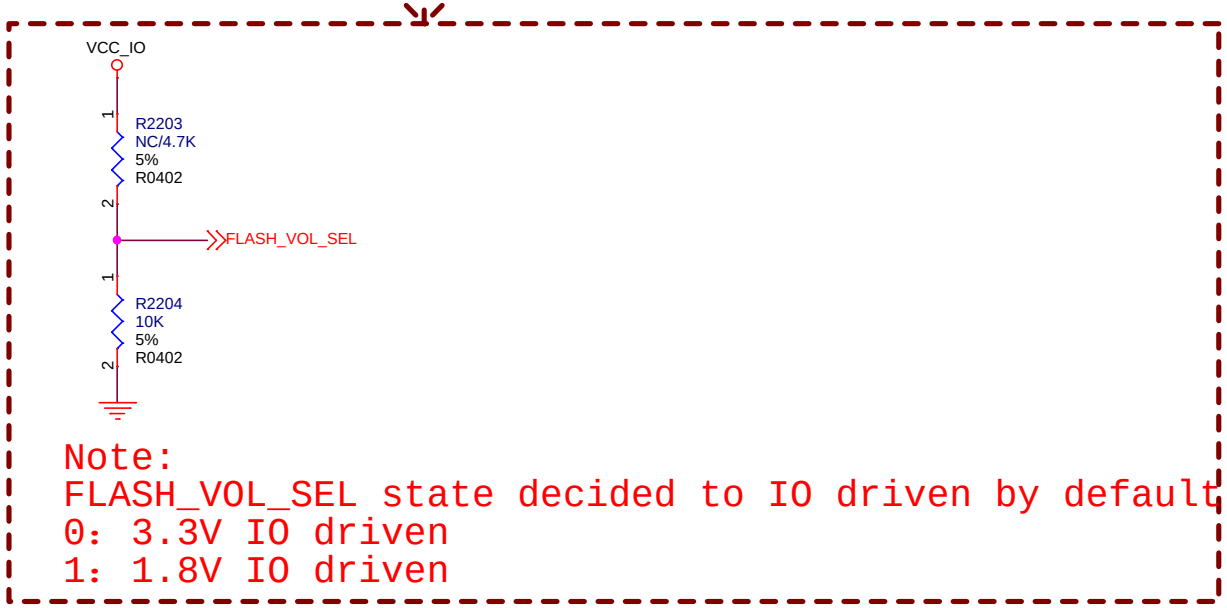


Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	TF/SD Card		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	20 of 33

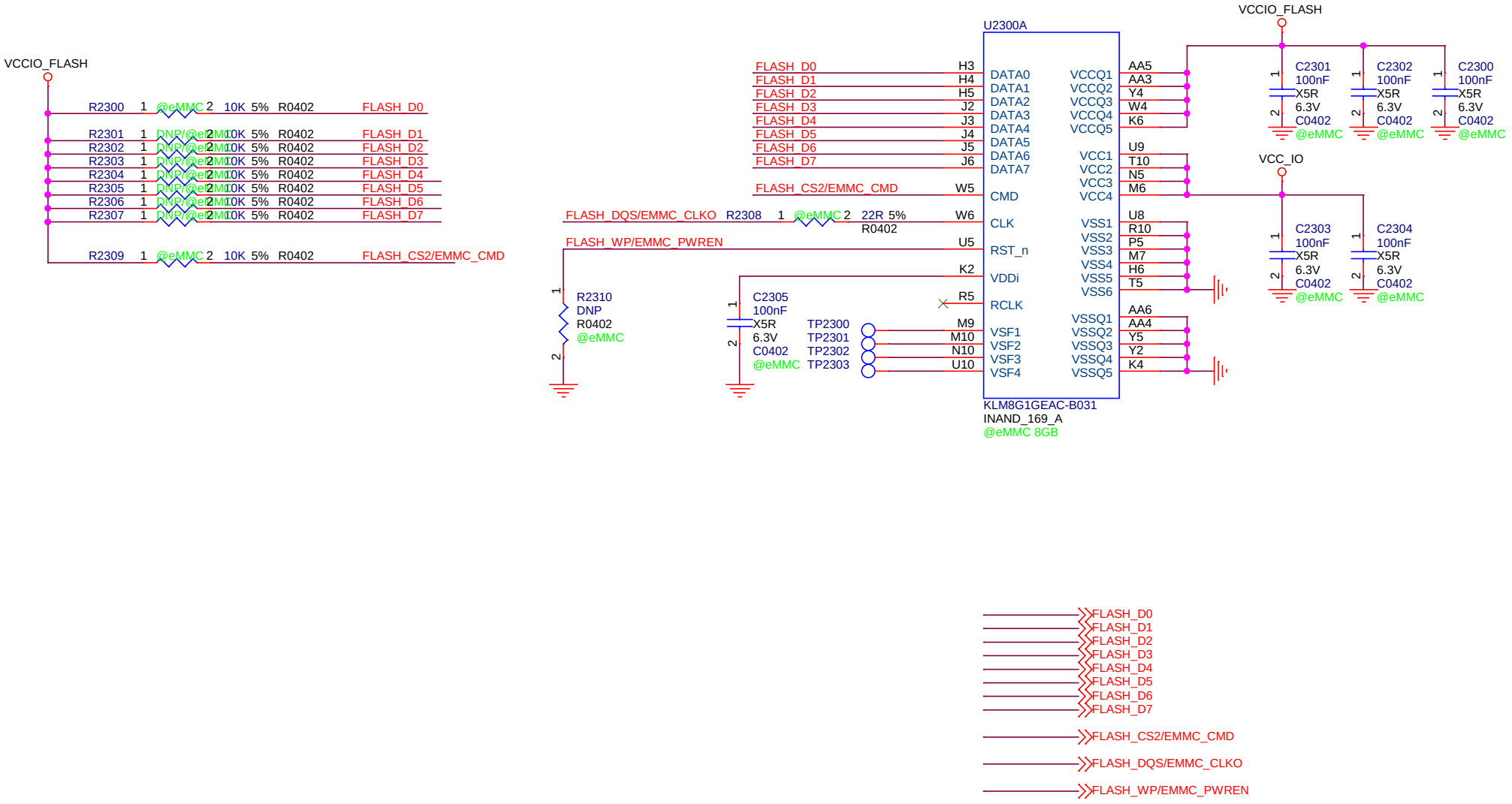


	Flash IO voltage	
eMMC (Default)	1.8V	Default
	3.3V	
Nand Flash	1.8V	
	3.3V	

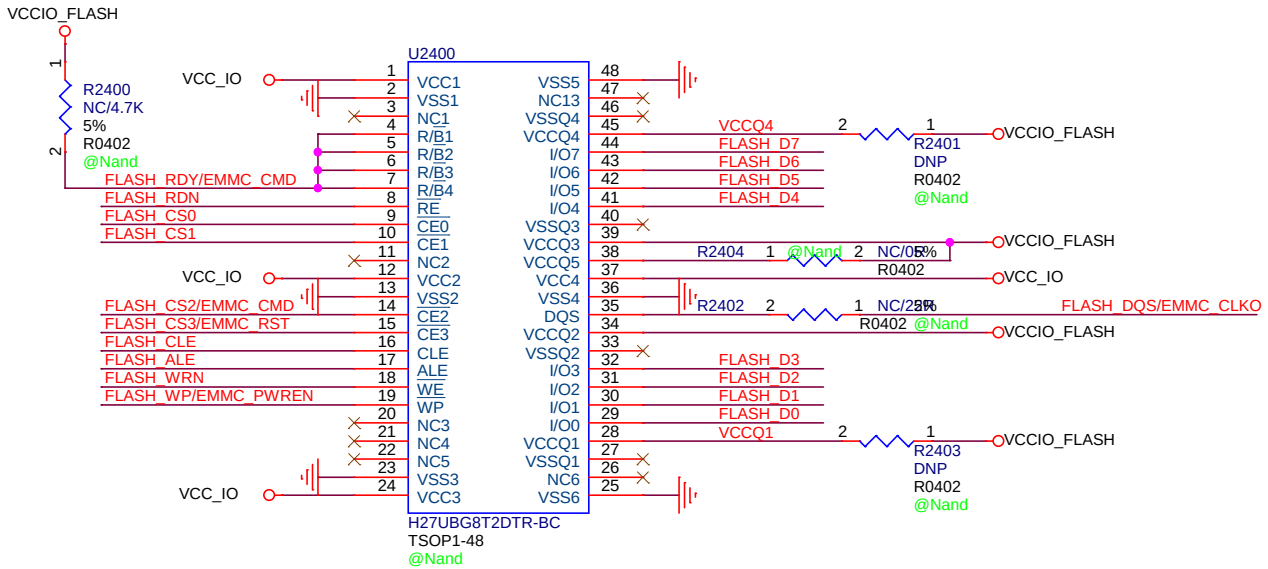




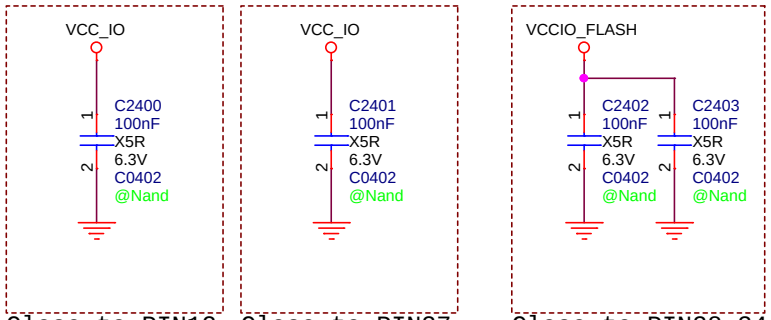
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	FLASH Power Manage		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	21 of 33

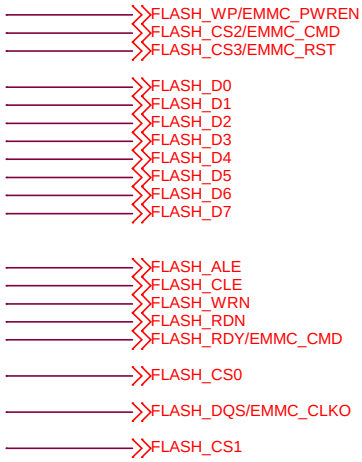


Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	FLASH-eMMC-Default		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	22 of 33

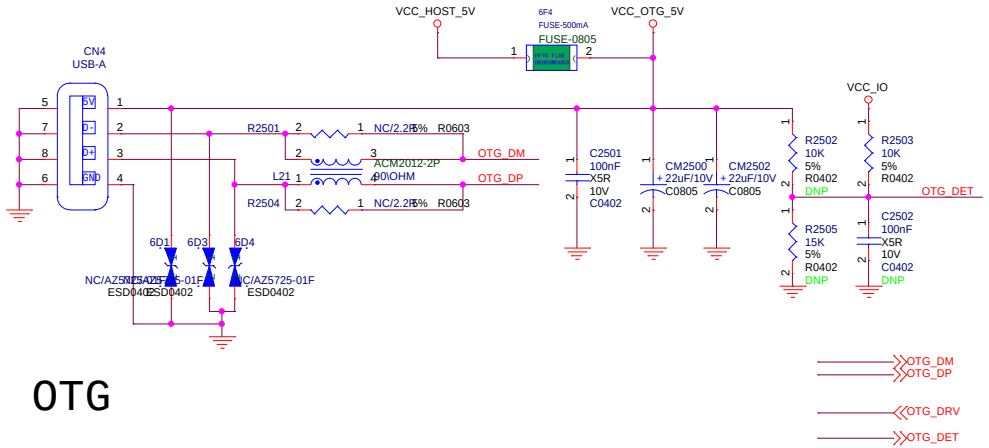


Note: if use toshiba and sandisk DDR mode,
VCCQ1 and VCCQ4 must be connected to VCC_IO。

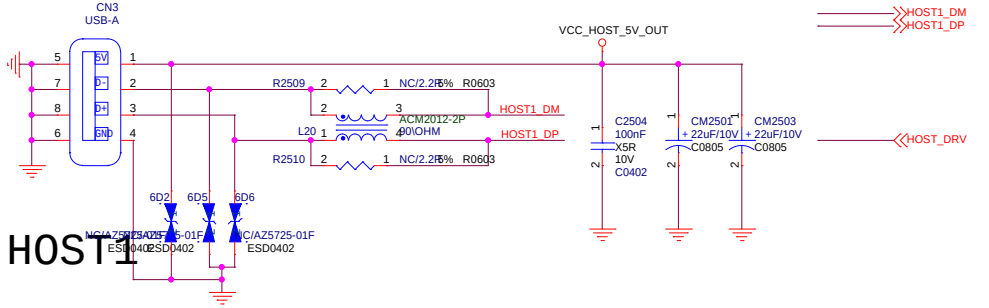




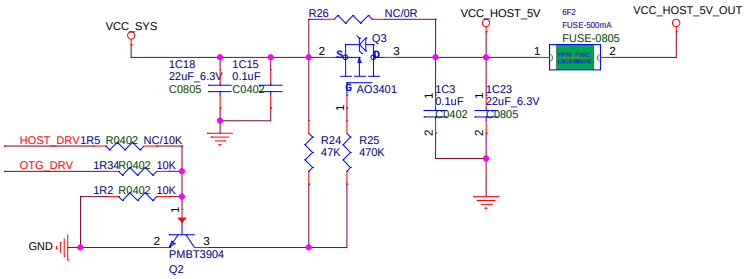
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	Flash-Nand Flash-option		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	23 of 33



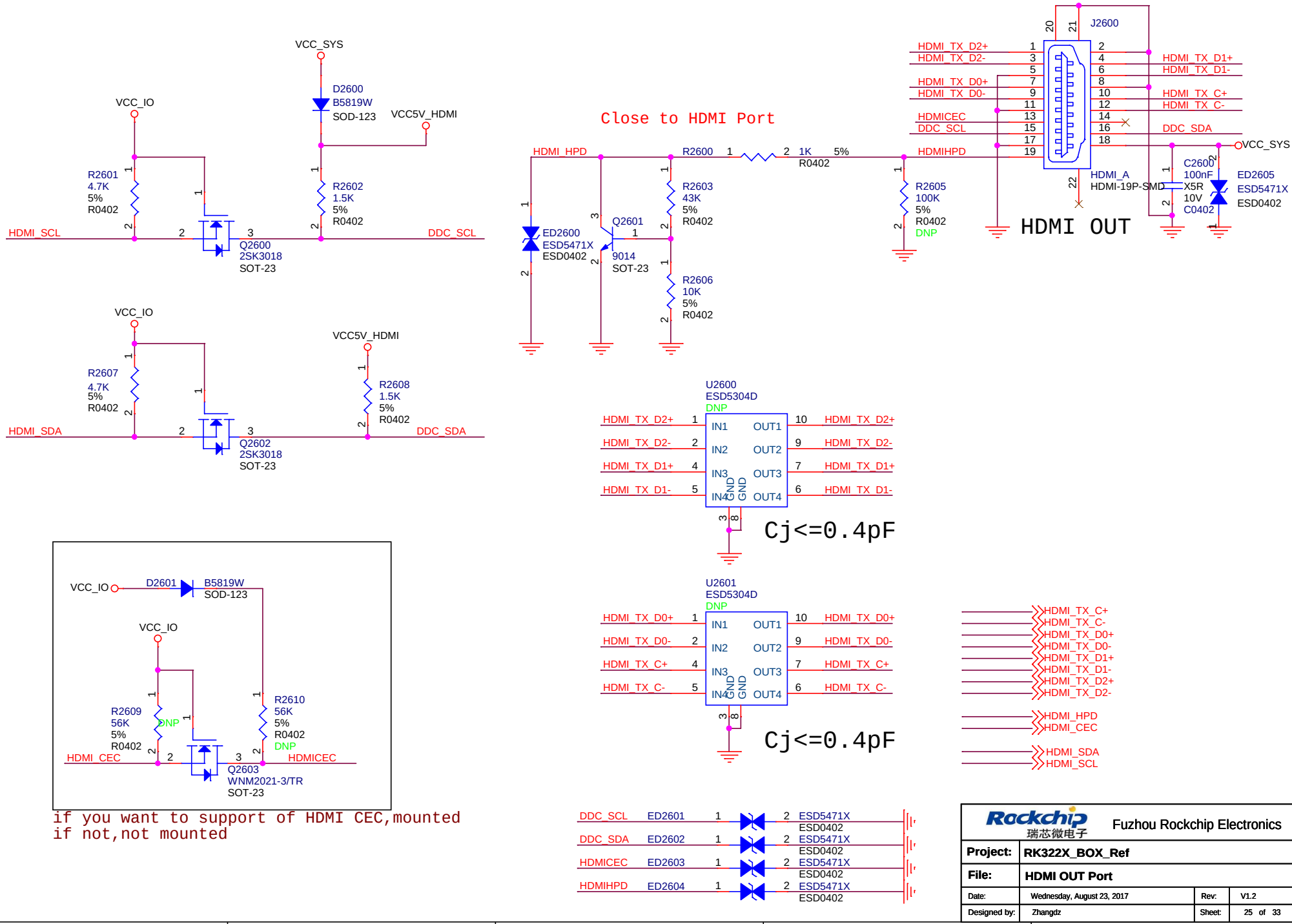
OTG



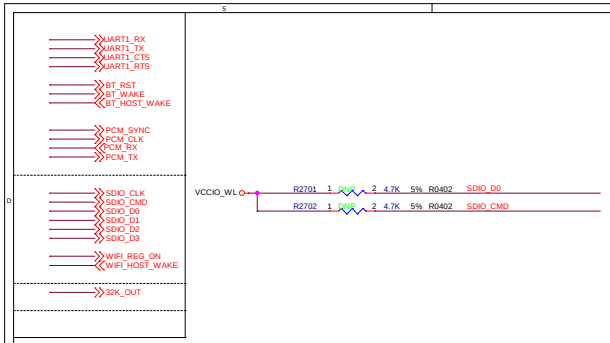
HOST1

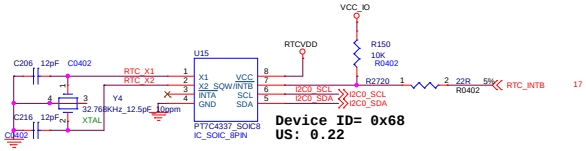


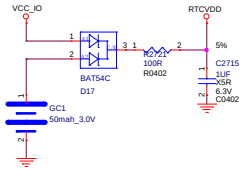
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	USB Port		
Date:	Wednesday, August 23, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	24 of 33

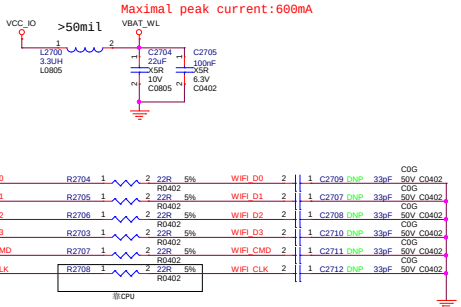


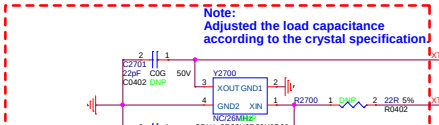
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	HDMI OUT Port		
Date:	Wednesday, August 23, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	25 of 33











1X1 WIFI
AP6181/AP6212/AP6330/AP6335/RTL8189ETV
RTL8723BS/XZ3538/XZ3660

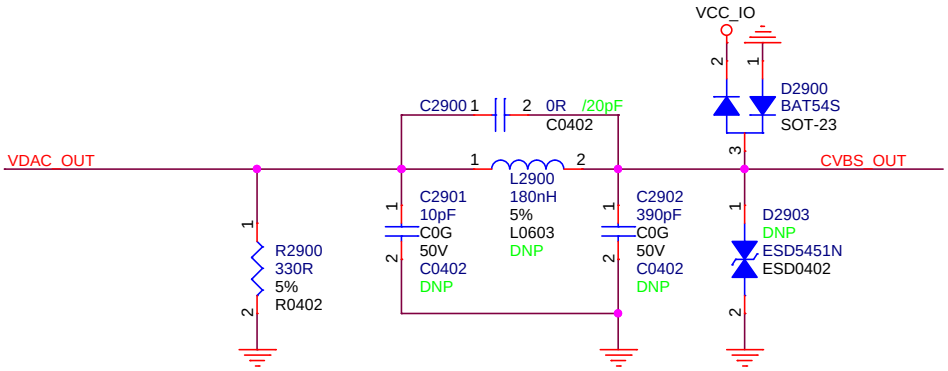
OPTION	WIFI				BT	Crystals	VDDIO
	a	b/g/n	ac	5GHz			
AP6181	No	Yes	No	No	No	26MHz	1.71-3.6V
AP6212 XZ3538	No	Yes	No	No	Yes	26MHz	1.71-3.6V
AP6330 XZ3660	Yes	Yes	No	Yes	Yes	26MHz	1.2-2.9V
AP6335	Yes	Yes	Yes	Yes	Yes	37.4MHz	1.71-3.63V
RTL8189ETV MODULE	No	Yes	No	No	No	40MHz On the module	3.3V
RTL8723BS	No	Yes	No	No	Yes		1.71-3.63V

OPTION	1	2	3	4	5
AP6181	Yes	Yes	No	Yes	
AP6212	Yes	Yes	No	Yes	
AP6330	Yes	Yes	No	Yes	
AP6335	Yes	Yes	Yes	Yes	
RTL8189ETV MODULE	No	No	No	No	
RTL8723BS	No	No	No	Yes	

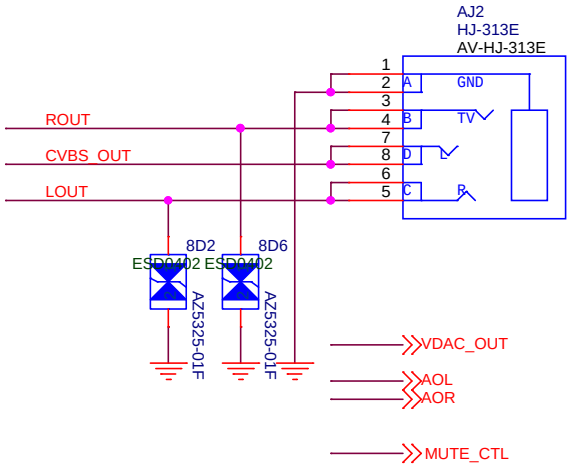
Default:AP6212

Note:
Yes:框内要贴
No:框内不贴

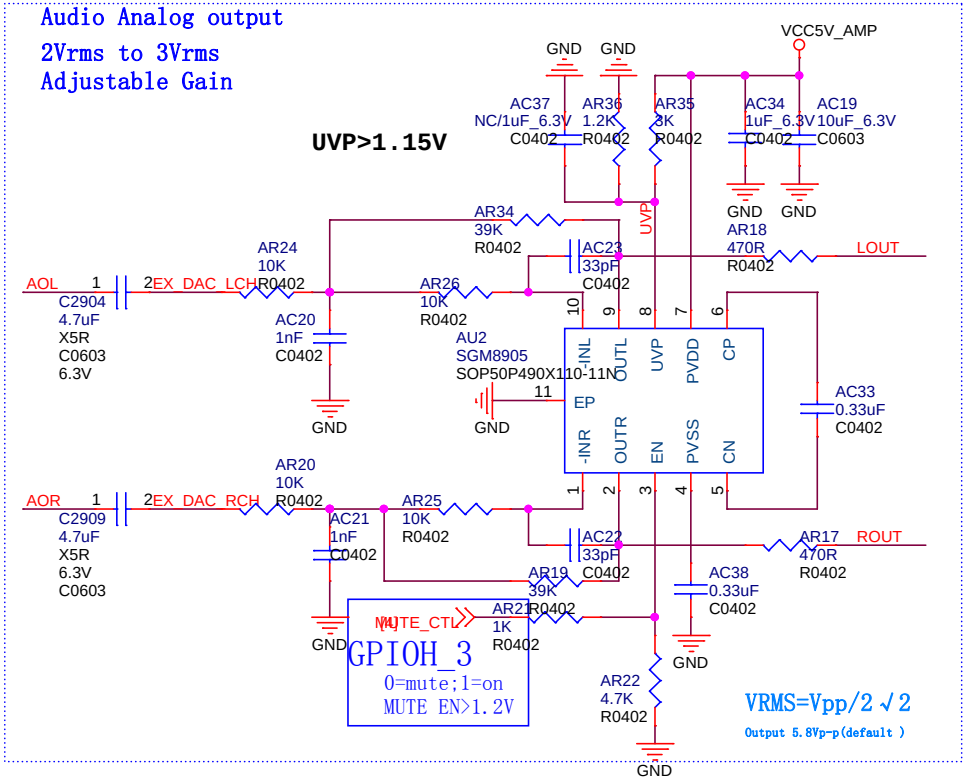
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics
Project:	RK322X_BOX_Ref
File:	WIFI+BT
Date: Thursday, August 17, 2017	Rev: V1.2
Designed by: Zhangqz	Sheet: 26 of 33

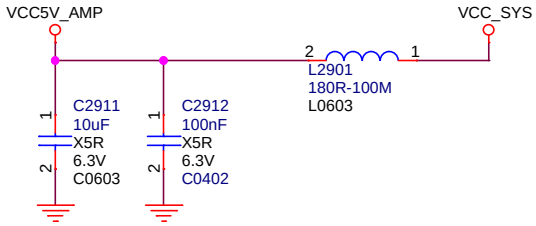


AV OUT

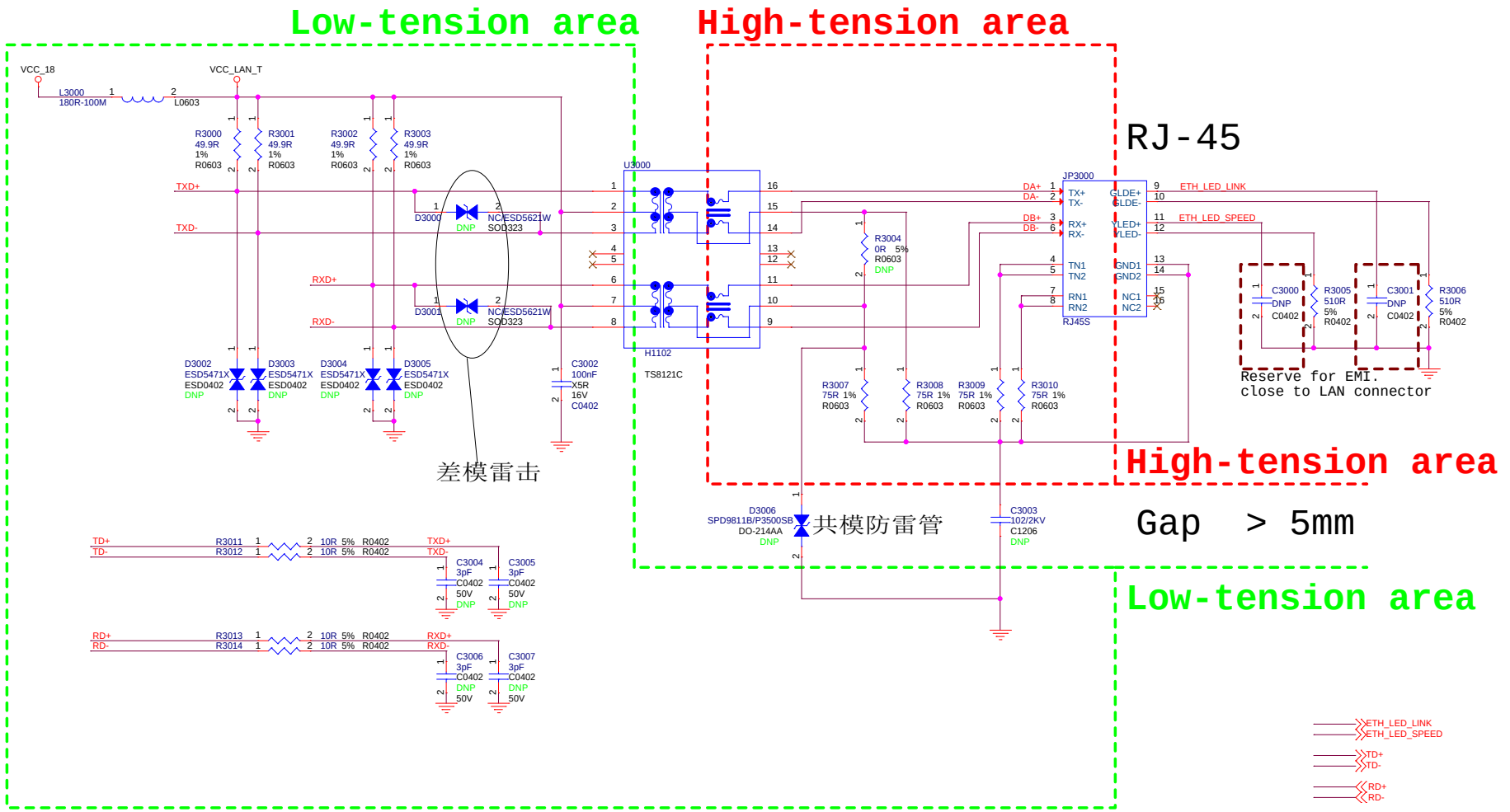


Amplification



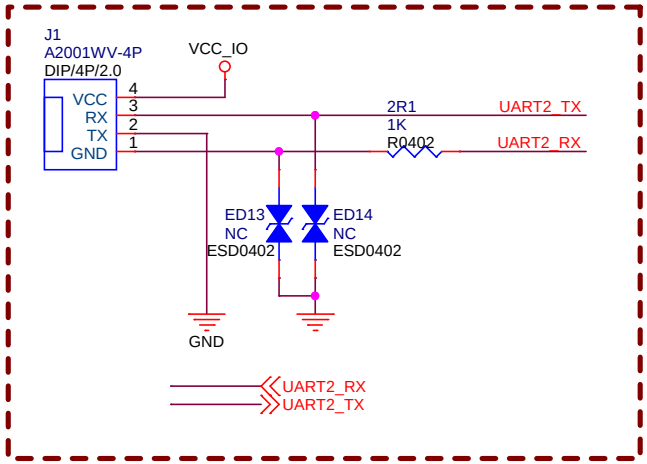


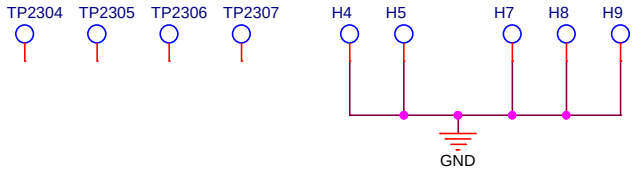
Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	AV OUT Port		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	28 of 33



Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	RJ45 Port-10/100M(Embed PHY)		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	29 of 33

Debug UART2





Rockchip 瑞芯微电子	Fuzhou Rockchip Electronics		
Project:	RK322X_BOX_Ref		
File:	Debug UART2		
Date:	Thursday, August 17, 2017	Rev:	V1.2
Designed by:	Zhangdz	Sheet:	31 of 33