

AM64x STARTER KIT EVM BOARD

SK-AM64B

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REV	A
VER	1.3
BOM Variant	002

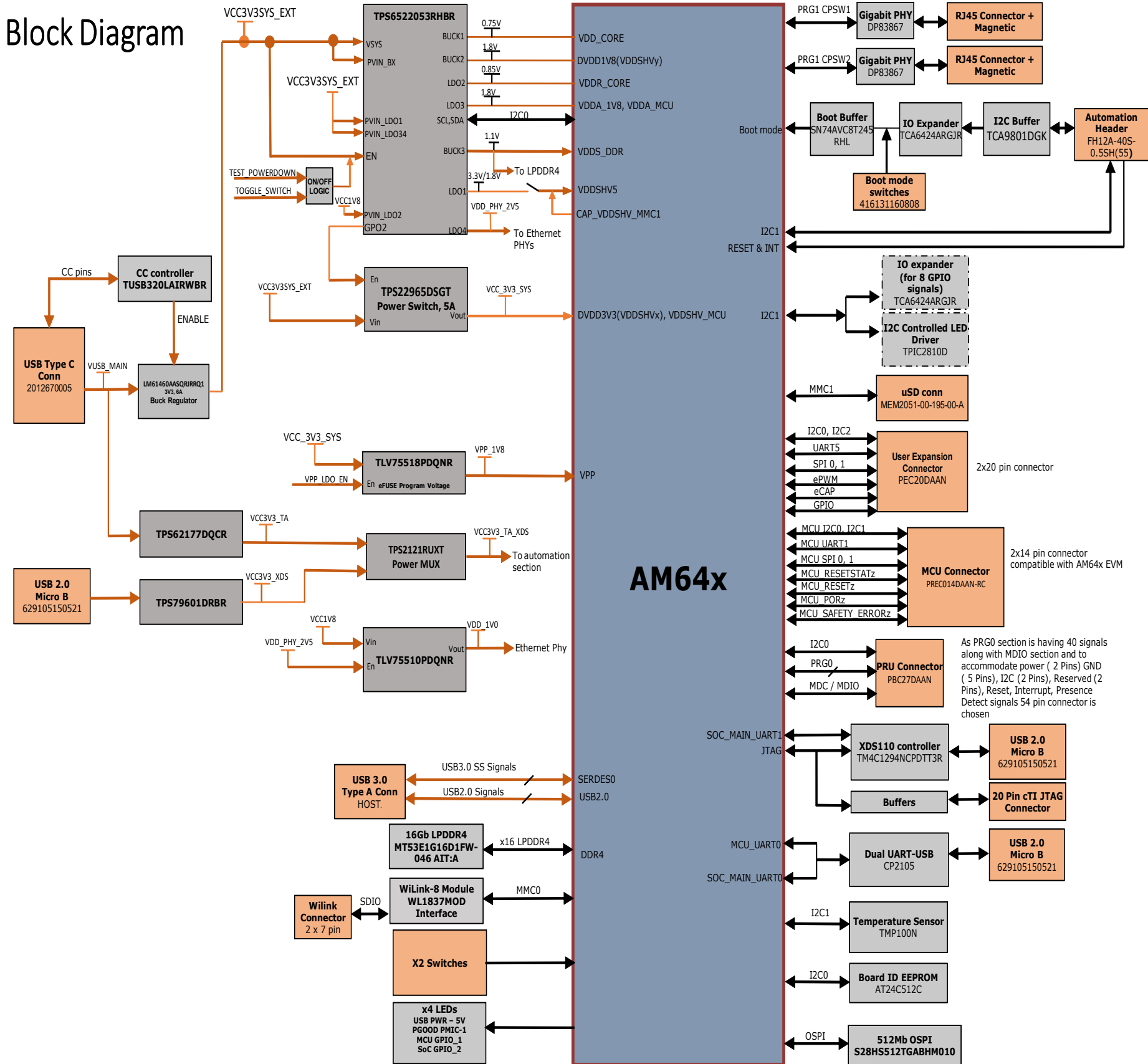
Note: Raspberry Pi is the trademark / wordmark of Raspberry Pi Foundation

REVISION HISTORY

VER #	DATE	DESCRIPTION OF CHANGES	AUTHOR	REVIEWED BY	APPROVED BY
1.0	20th APR 2022	Drafted from "PROC100E4_SCH" Document and updated PG2.0 changes.	Mistral Design Team	Krishna Prasad	Krishna Prasad
1.1	21st APR 2022	Power Mux added, R375 added, R138 is replaced to 0E from 1M ohm, R469 & R470 are removed, C343 is made as DNI.	Mistral Design Team	Krishna Prasad	Krishna Prasad
1.2	21st APR 2022	Antenna Tuning Network C2, L2 and L4 values updated	Mistral Design Team	Krishna Prasad	Krishna Prasad
1.3	12th SEPT 2022	PMIC Buck Capacitors replaced with 47uF (C373, C374, C376), RSVD ball names updated in SoC and Replaced obsolete components with alternate components.	Mistral Design Team	Krishna Prasad	Krishna Prasad

BLOCK DIAGRAM_AM64x_SKEVM

Functional Block Diagram



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Title BLOCK DIAGRAM

Size PROC100A 002

C

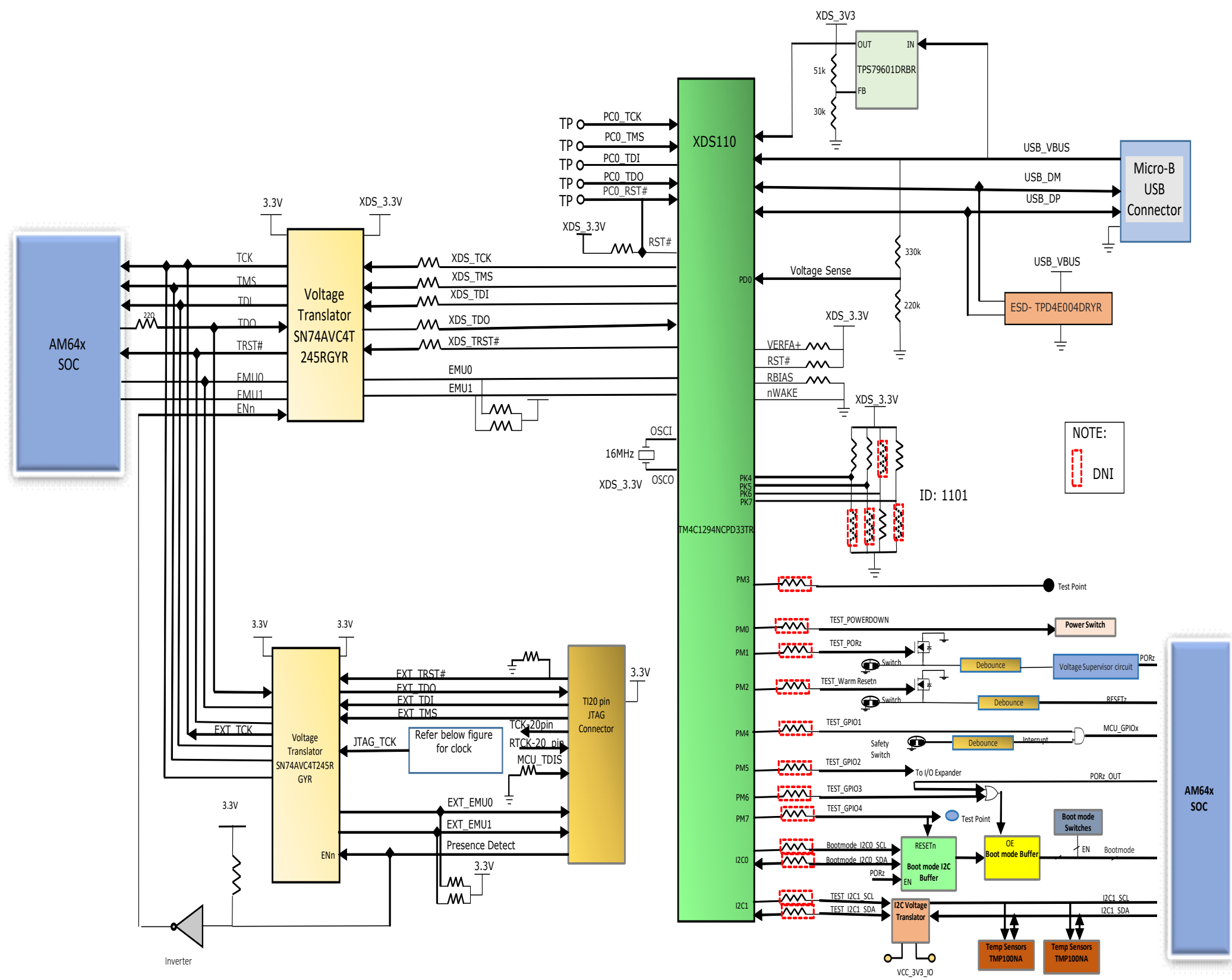
Date: Wednesday, March 29, 2023

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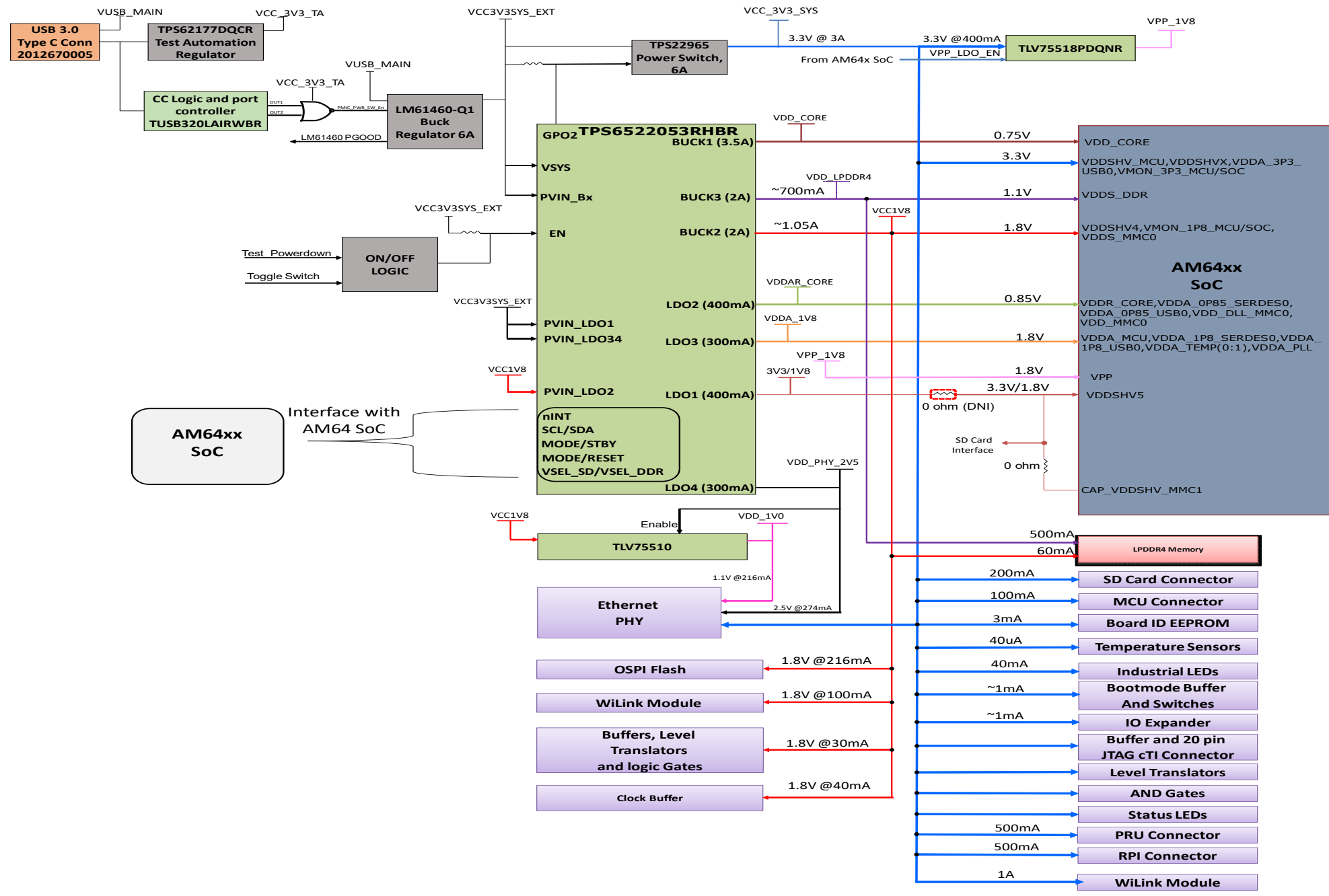
Rev

A

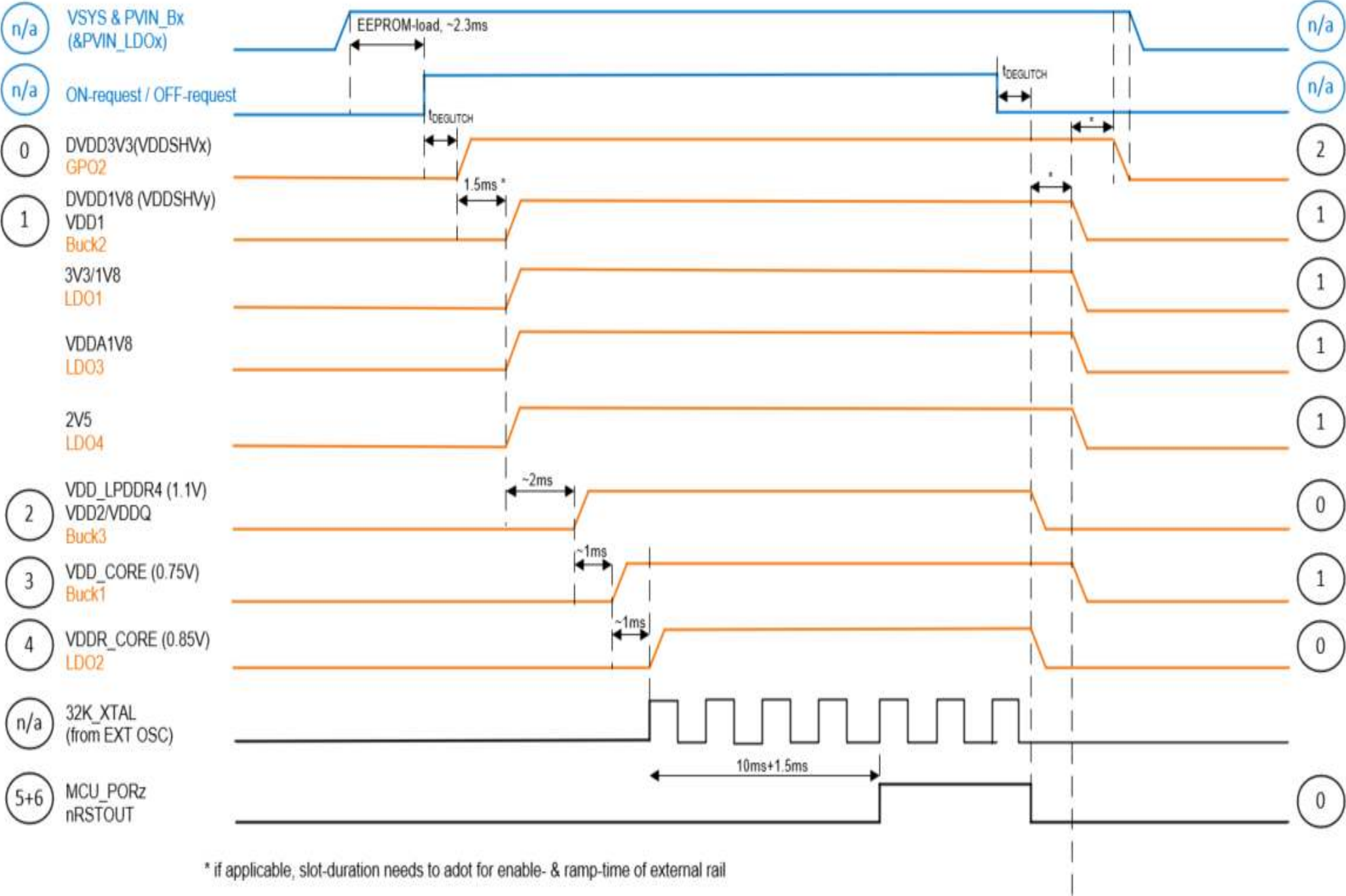
BLOCK DIAGRAM_XDS110



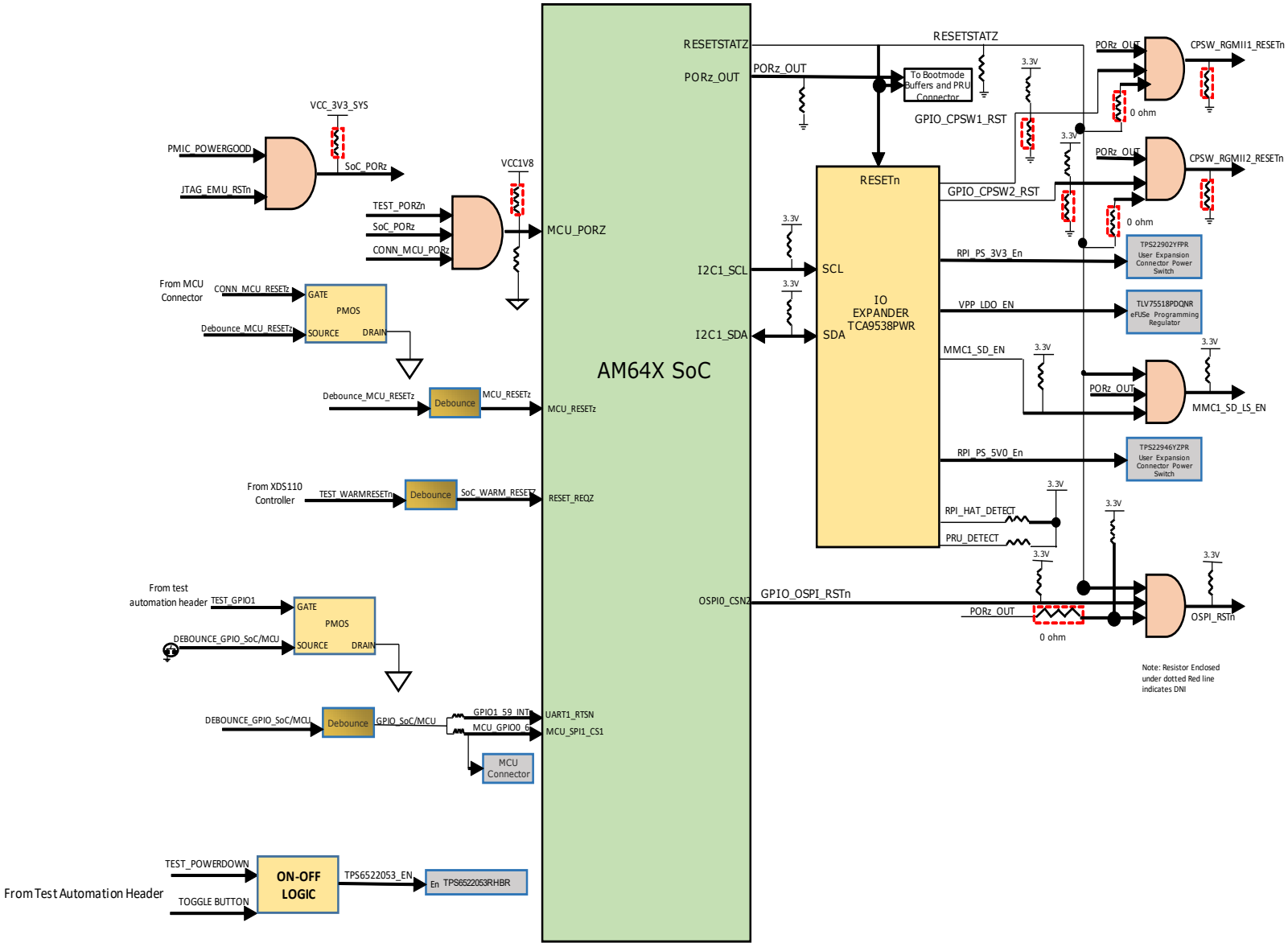
POWER BLOCK DIAGRAM



POWER SEQUENCE



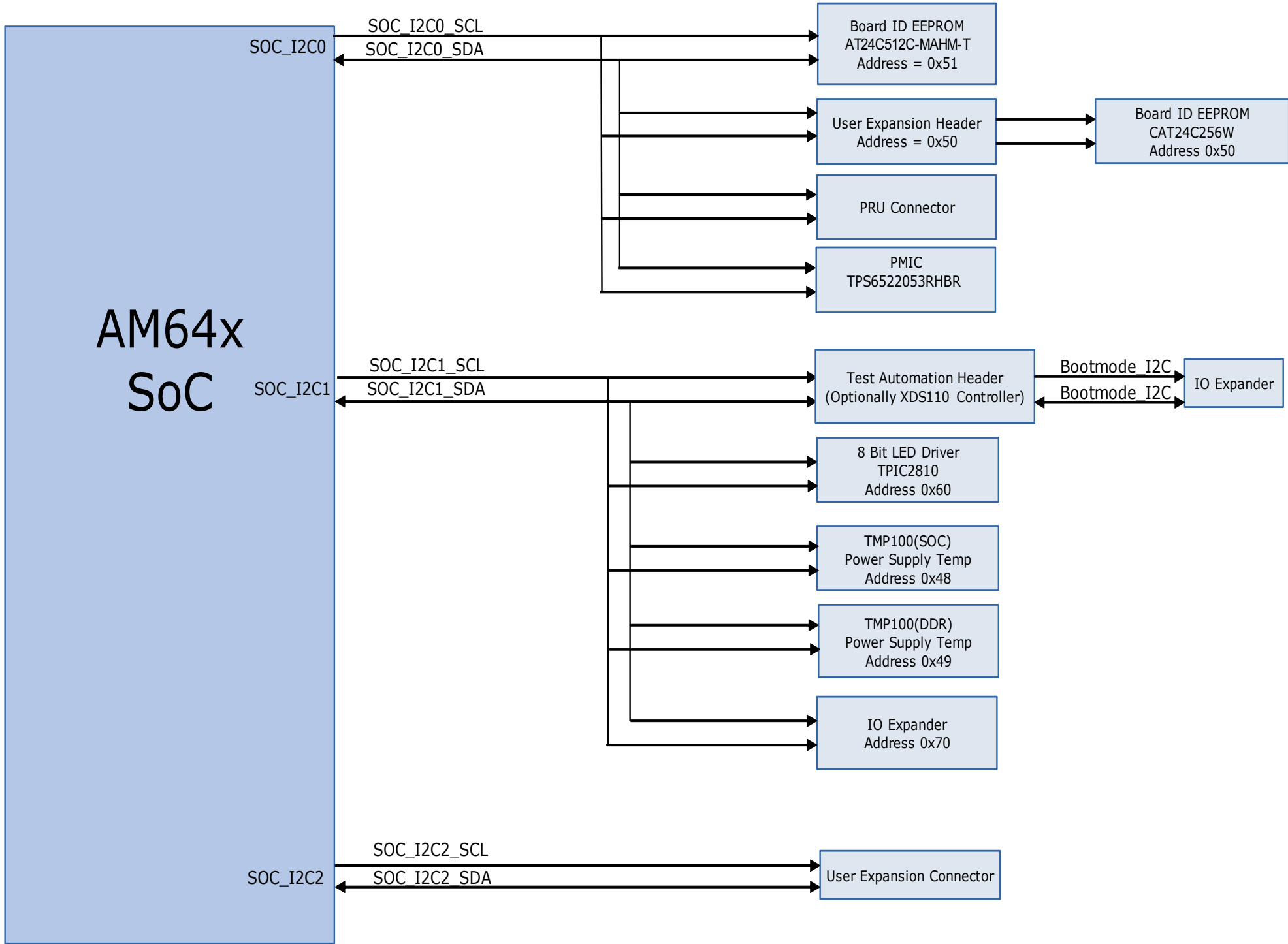
RESET ARCHITECTURE



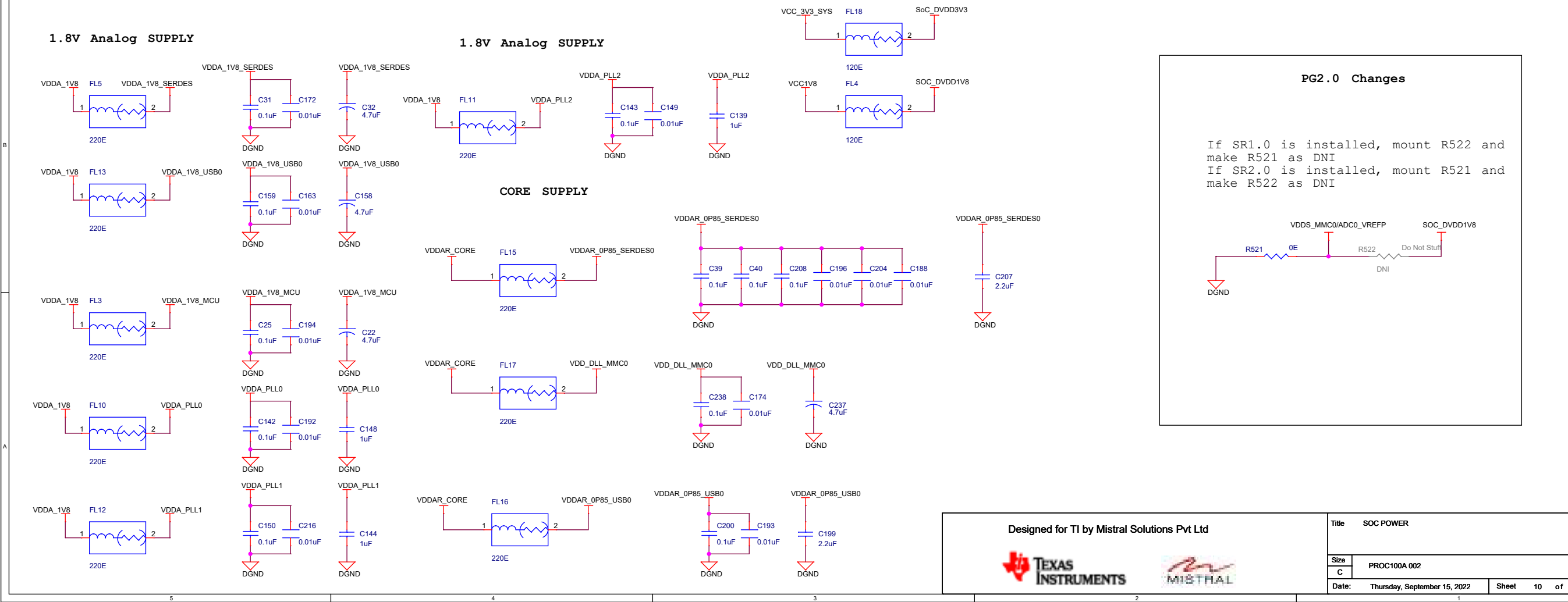
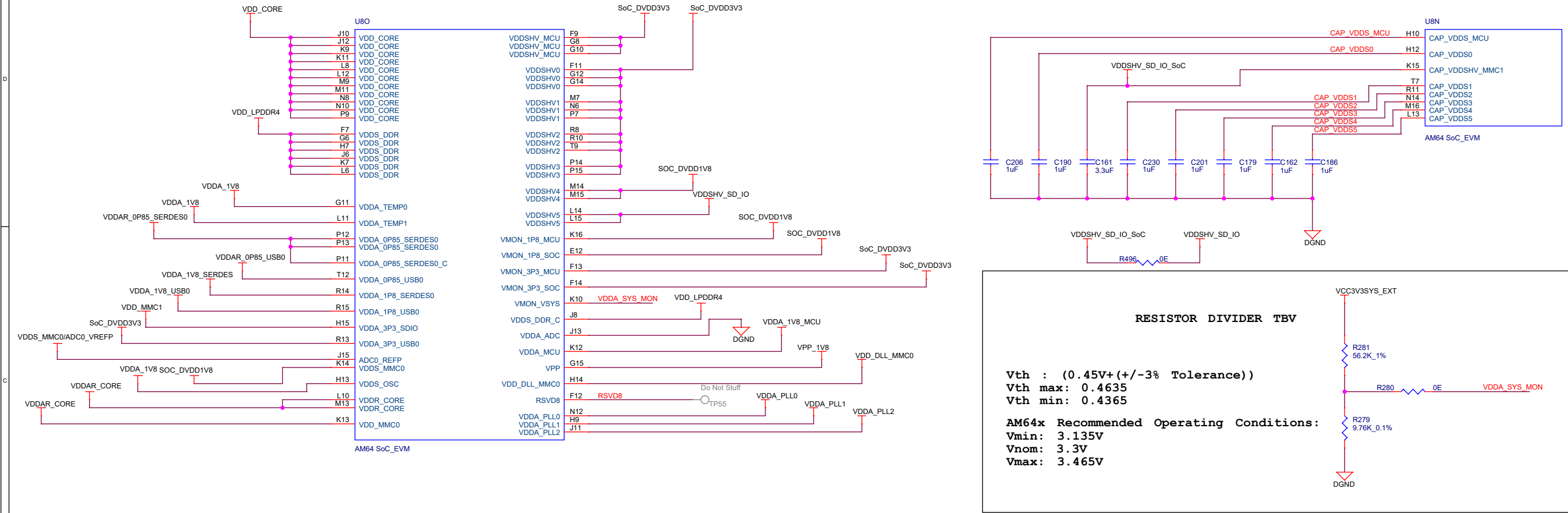
GPIO MAPPING TABLE

AM64x GPIO MAPPING TABLE										
SI.NO	GPIO Description	GPIO Netname	Functionality	GPIO Used	SoC Muxed Signal Name	Direction with respect to SoC	Default State	Active State	Voltage Domain On Processor Side	Voltage Connected on SKEVM
1	IO Expander Interrupt	IO_EXP_INTn_SDIO	Interrupt	GPIO1_78	MMC1_SDWP	Input	High	Low	VDDSHV0	SoC_DVDD3V3
2	Enable for COM8 Level Translator	COM8_LS_EN	Enable	GPIO0_62	PRG1_PRU0_GPO17	Output	High	Low	VDDSHV2	SoC_DVDD3V3
3	Enable for WLAN Interface in COM8 Connector	WLAN_EN_SoC_LS	Enable	GPIO0_48	PRG1_PRU0_GPO3	Output	Low	High	VDDSHV2	SoC_DVDD3V3
4	Enable for BT Interface in COM8 Connector	BT_EN_SOC_LS	Enable	GPIO0_49	PRG1_PRU0_GPO4	Output	Low	High	VDDSHV2	SoC_DVDD3V3
5	WLAN SDIO out-of band interrupt line	WLAN_IRQ_LS	Interrupt	GPIO0_46	PRG1_PRU0_GPO1	Input	High	Low	VDDSHV2	SoC_DVDD3V3
6	OSPI Interrupt	OSPI_INTn	Interrupt	GPIO0_14	OSPI0_CSN3	Input	High	Low	VDDSHV4	SOC_DVDD1V8
7	OSPI Reset Control GPIO	GPIO_OSPI_RSTn	Reset	GPIO0_13	OSPI0_CSN2	Output	High	Low	VDDSHV4	SOC_DVDD1V8
8	User LED	TEST_LED1	Test	GPIO0_60	PRG1_PRU0_GPO15	Output	Low	High	VDDSHV2	SoC_DVDD3V3
9	User LED	TEST_LED2	Test	MCU_GPIO0_5	MCU_SPI1_CS0	Output	Low	High	VDDSHV_MCU	SoC_DVDD3V3
10	SD card load switch enable control	MMC1_SD_EN	Enable	IO Expander-P3		Output	High	High	VDDSHV0	SoC_DVDD3V3
11	CPSW Ethernet PHY Interrupt	CPSW_RGMII_INTn	Interrupt	GPIO1_70	EXTINTn	Input	High	Low	VDDSHV0	SoC_DVDD3V3
12	PRU Connector Interrupt	PRU_INTn								
13	CPSW Ethernet PHY-1 Reset Control GPIO	GPIO_CPSW1_RST	Reset	IO Expander-P1		Output	High	Low	VDDSHV0	SoC_DVDD3V3
14	CPSW Ethernet PHY-2 Reset Control GPIO	GPIO_CPSW2_RST	Reset	IO Expander-P0		Output	High	Low	VDDSHV0	SoC_DVDD3V3
15	TEST GPIO1 from Test Automation	TEST_GPIO1	GPIO for communication with AM64x	GPIO1_59	UART1_RTSN	Input	High	Low	VDDSHV0	SoC_DVDD3V3
				MCU_GPIO0_6	MCU_SPI1_CS1	Input	High	Low	VDDSHV_MCU	SoC_DVDD3V3
16	BTUART_RTS or Bootmode10 switch select	BTUART_RTS_SEL	Switch Selection	GPIO0_63	PRG1_PRU0_GPO18	Output	Low	High	VDDSHV2	SoC_DVDD3V3
17	VPP 1.8V regulator Enable	VPP_LDO_EN	Enable	IO Expander-P4		Output	Low	High	VDDSHV0	SoC_DVDD3V3
18	MODE/STBY	PMIC_STBY	Standby Mode	GPIO0_51	PRG1_PRU0_GPO6	Output	High	Low	VDDSHV2	SoC_DVDD3V3
19	VSEL_SD/VSEL_DDR	VSEL_SD_SWITCH	SD Selection	GPIO0_45	PRG1_PRU0_GPO2	Output	High	High	VDDSHV2	SoC_DVDD3V3
20	Power Switch Enable for USB device	USB0_DRVBUS	Enable	GPIO1_79	USB0_DRVVBUS	Output	Low	High	VDDSHV0	SoC_DVDD3V3
21	RPI-HAT Detection	RPI_HAT_DETECT	Detection	IO Expander-P7		Input	High	Low	VDDSHV0	SoC_DVDD3V3
22	PRU Detection	PRU_DETECT	Detection	IO Expander-P2		Input	High	Low	VDDSHV0	SoC_DVDD3V3
23	PRU Power Switch Enable	PRU_3V3_En	Enable	GPIO0_64	PRG1_PRU0_GPO19	Output	Low	High	VDDSHV2	SoC_DVDD3V3
24	Rpi Power Switch Enable	RPI_PS_5V0_En	Enable	IO Expander-P6		Output	Low	High	VDDSHV0	SoC_DVDD3V3
25	Rpi Power Switch Enable	RPI_PS_3V3_En	Enable	IO Expander-P5		Output	Low	High	VDDSHV0	SoC_DVDD3V3

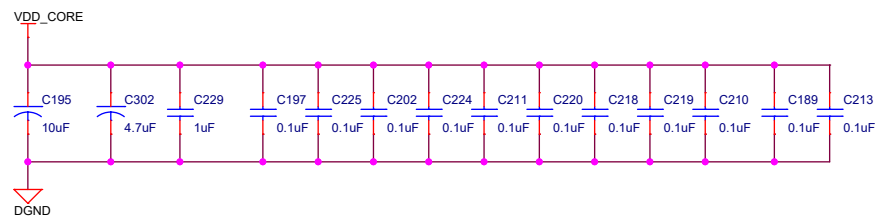
I2C TREE



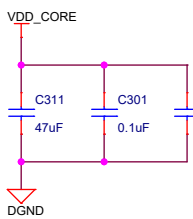
SOC POWER



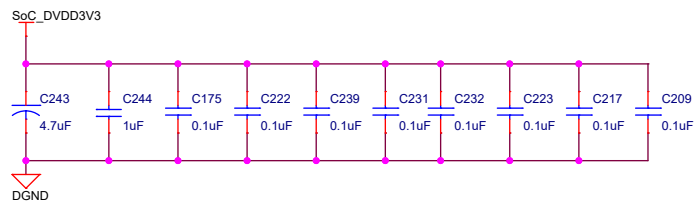
SOC POWER DECAPS



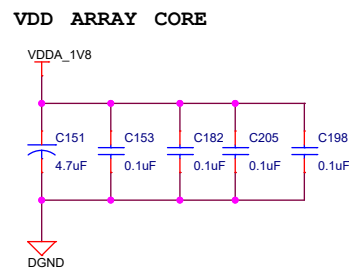
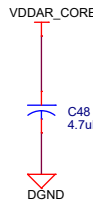
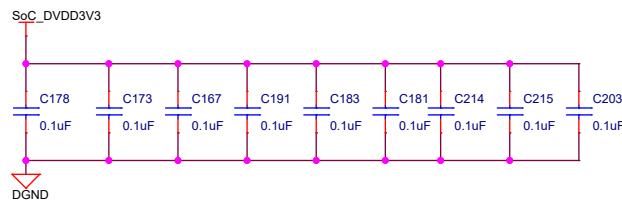
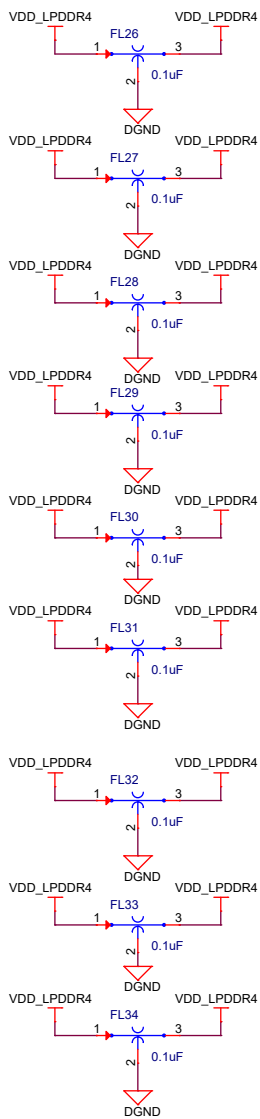
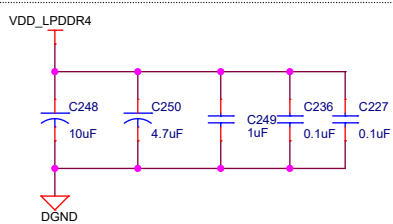
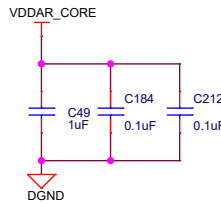
Place one 0.1uF cap near each Pin



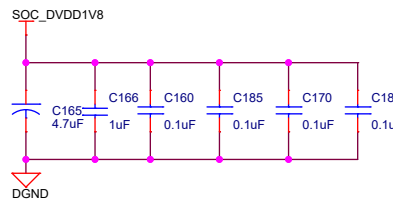
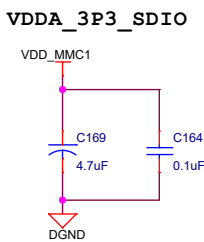
To place after current sense resistor on VDD_CORE plane



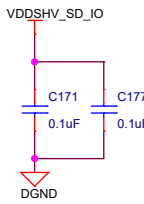
Place one 0.1uF cap near each Pin



Place one 0.1uF cap near each Pin



Place one 0.1uF cap near each Pin



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Title SOC POWER DECAPS

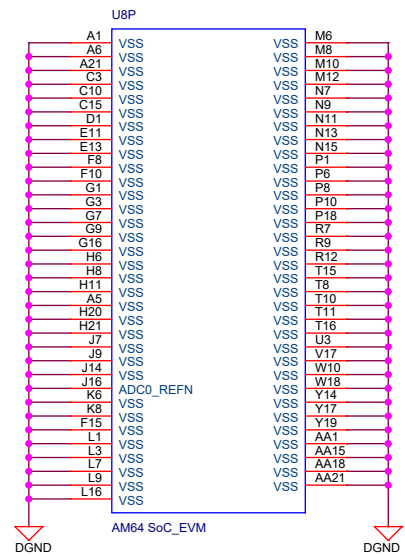
Size PROC100A 002

Date: Thursday, September 15, 2022

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Rev A

SOC POWER - VSS



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Title SOC VSS

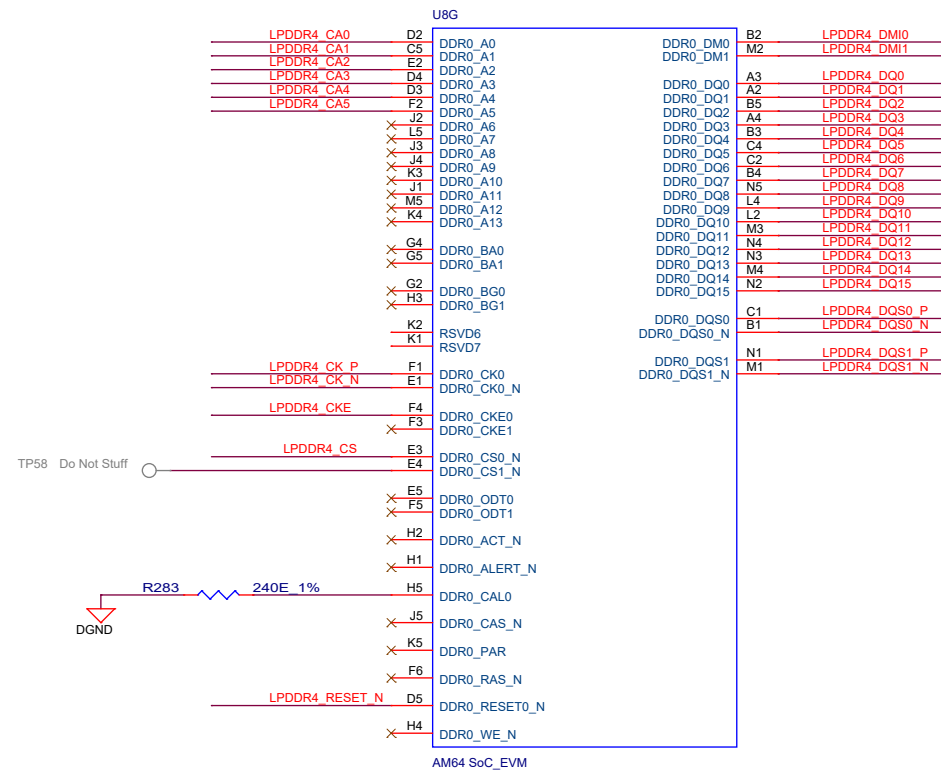
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Rev A

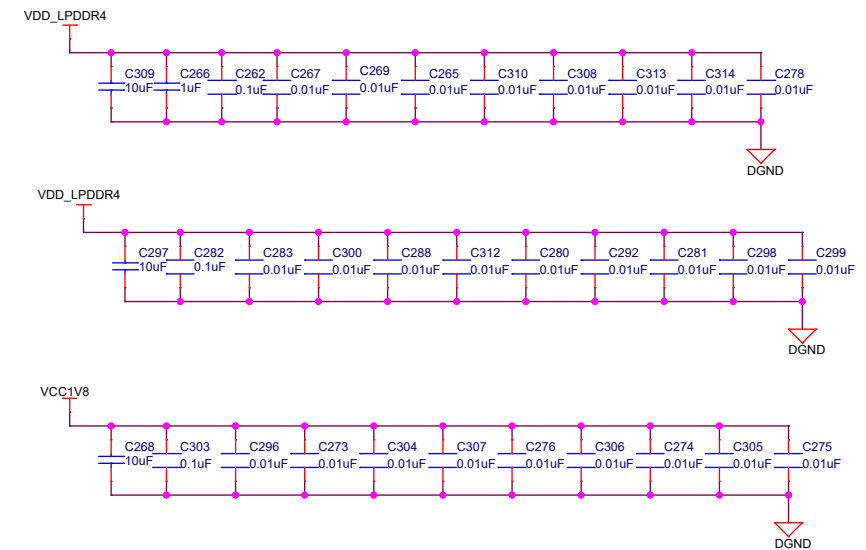
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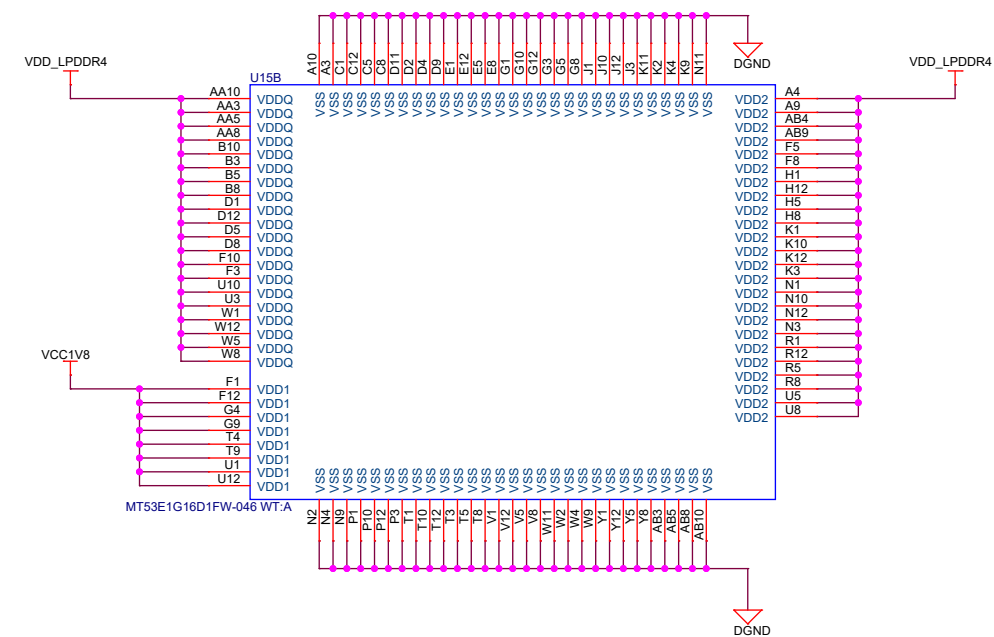
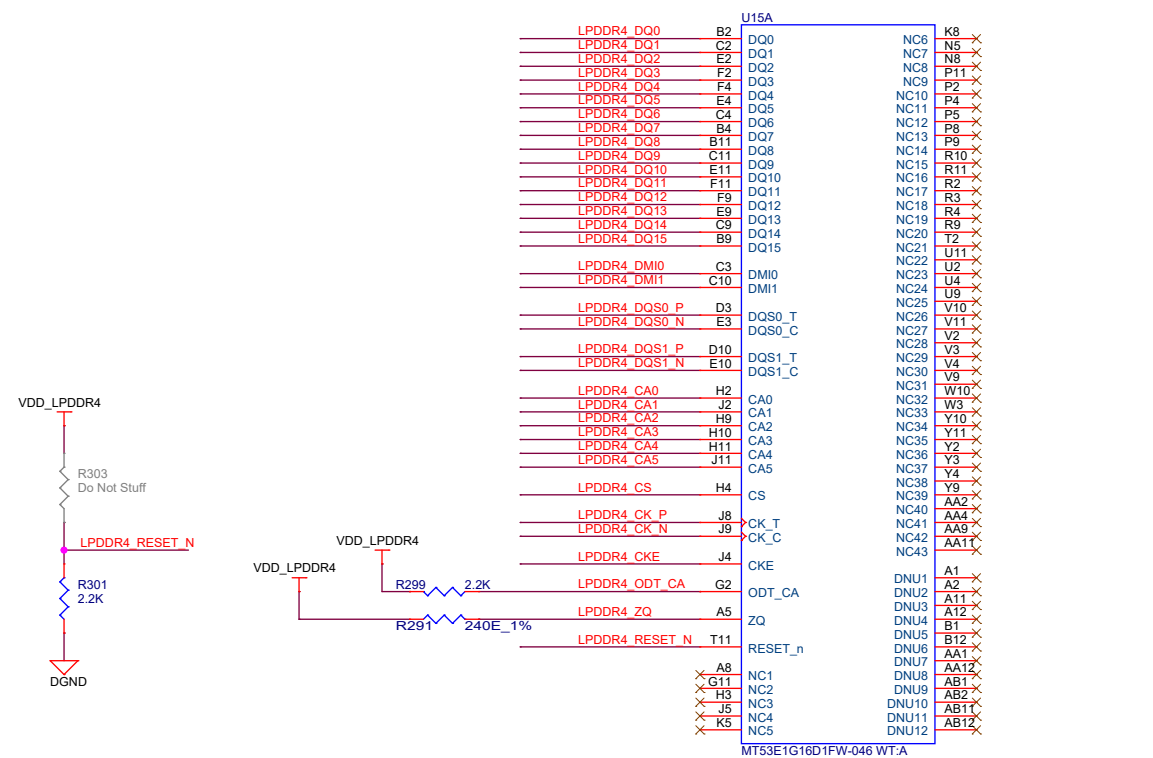
SOC LPDDR4 INTERFACE



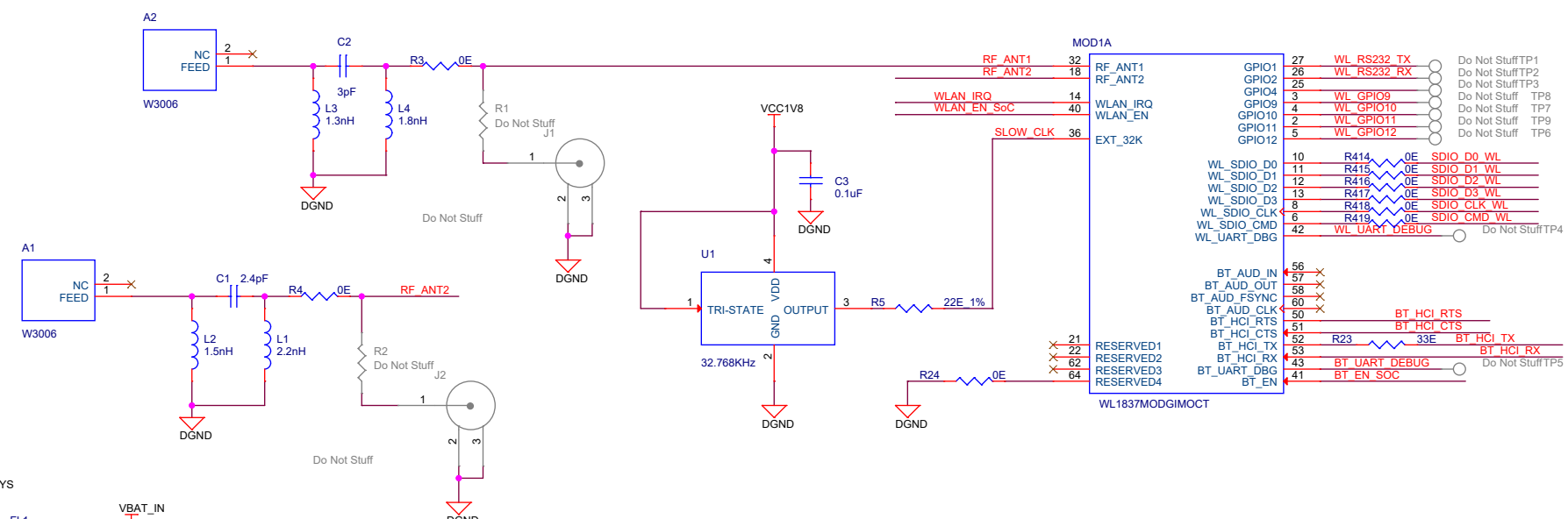
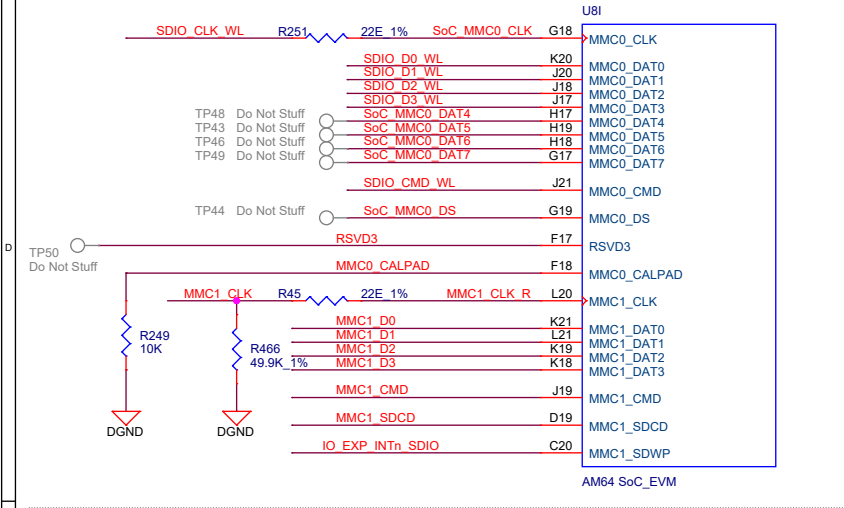
LPDDR4 POWER DECAPS



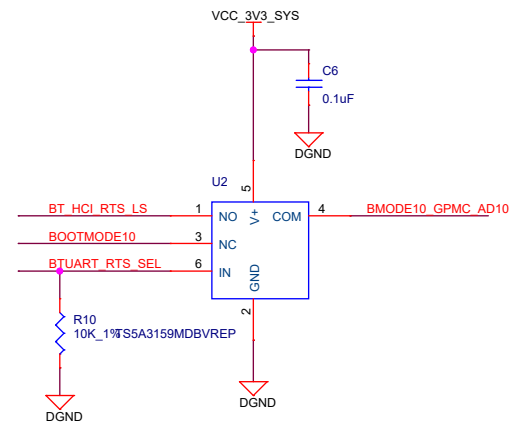
LPDDR4 DEVICE



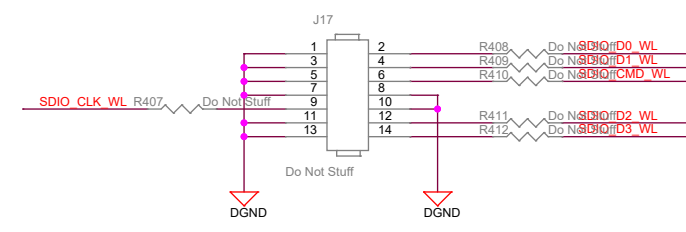
WL1837 MODULE



BOOTMODE10/ BTUART RTS SELECT SWITCH

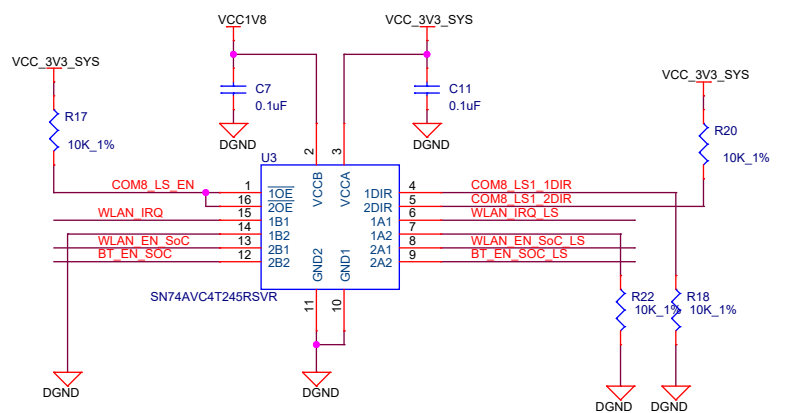


WILINK CONNECTOR

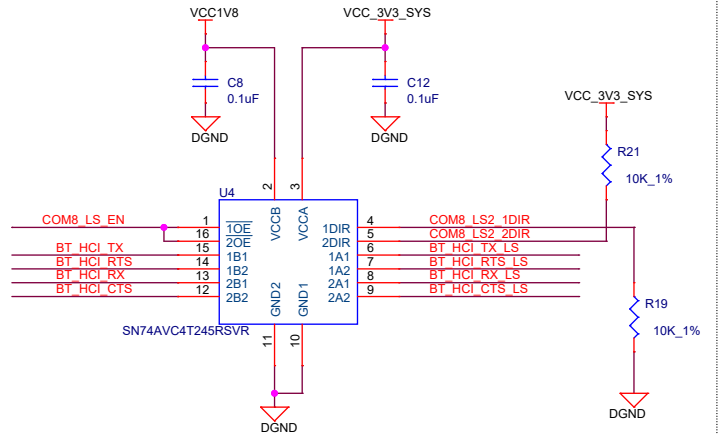


PCB NOTE: PLACE SERIES RESISTOR NEAR WILINK CONNECTOR AND WLINK MODULE LIKE A TRIPAD RESISTOR, TO AVOID STUB

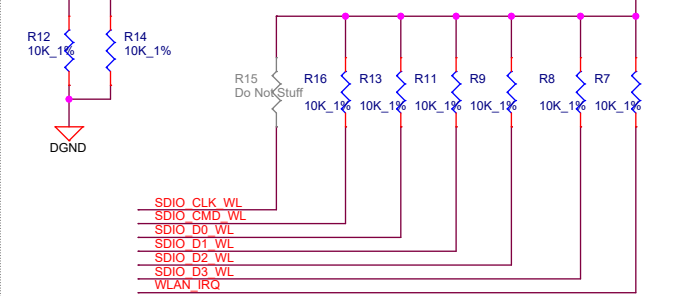
COM8 LEVEL TRANSLATOR-1



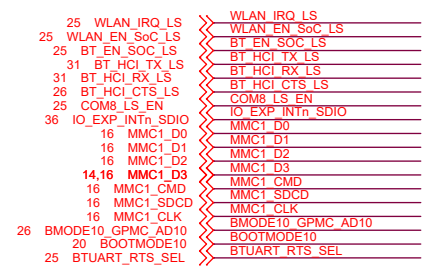
COM8 LEVEL TRANSLATOR-2



WLAN EN SoC BT EN SoC



OFF PAGE CONNECTIONS

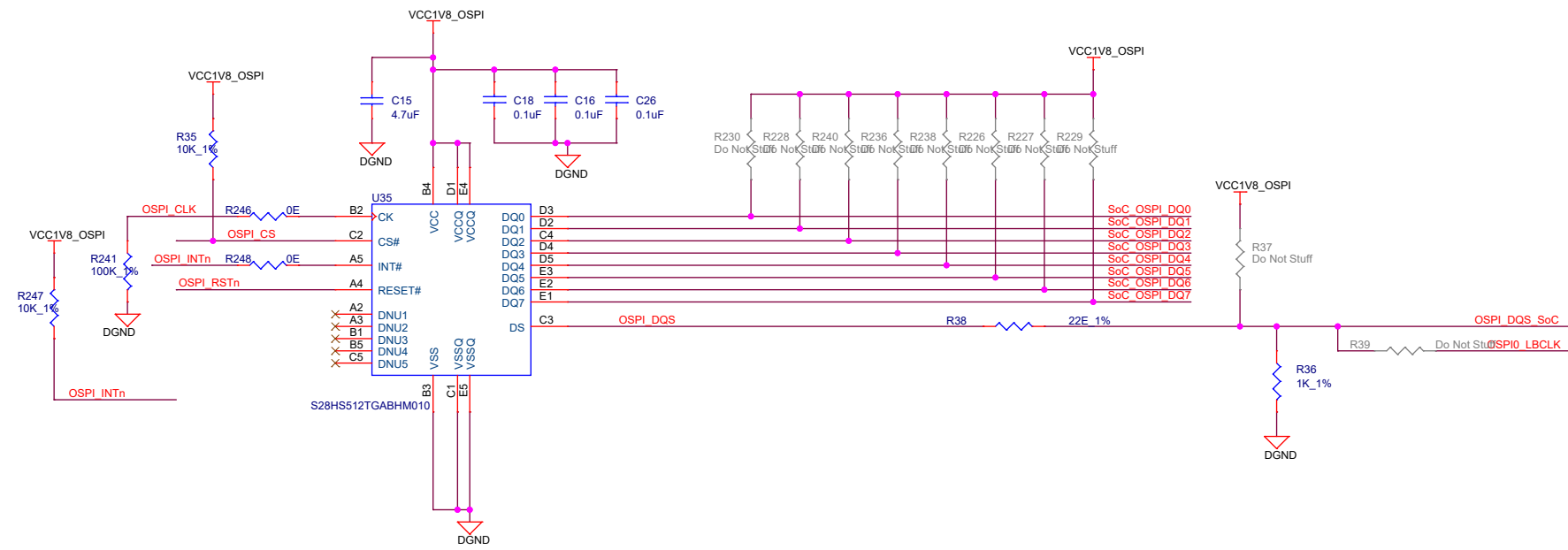


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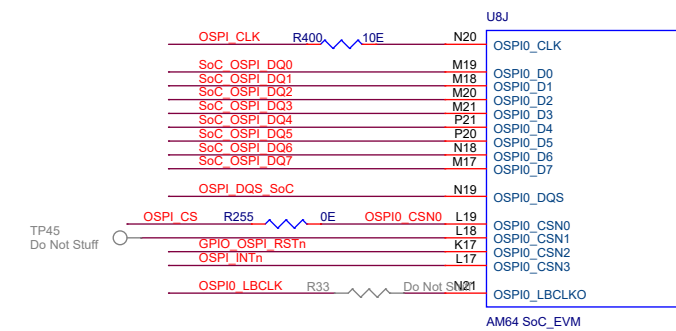


Title WL1837 MODULE		
Size	PROC100A 002	Rev
C		A
Date:	Monday, June 19, 2023	Sheet 14 of 43

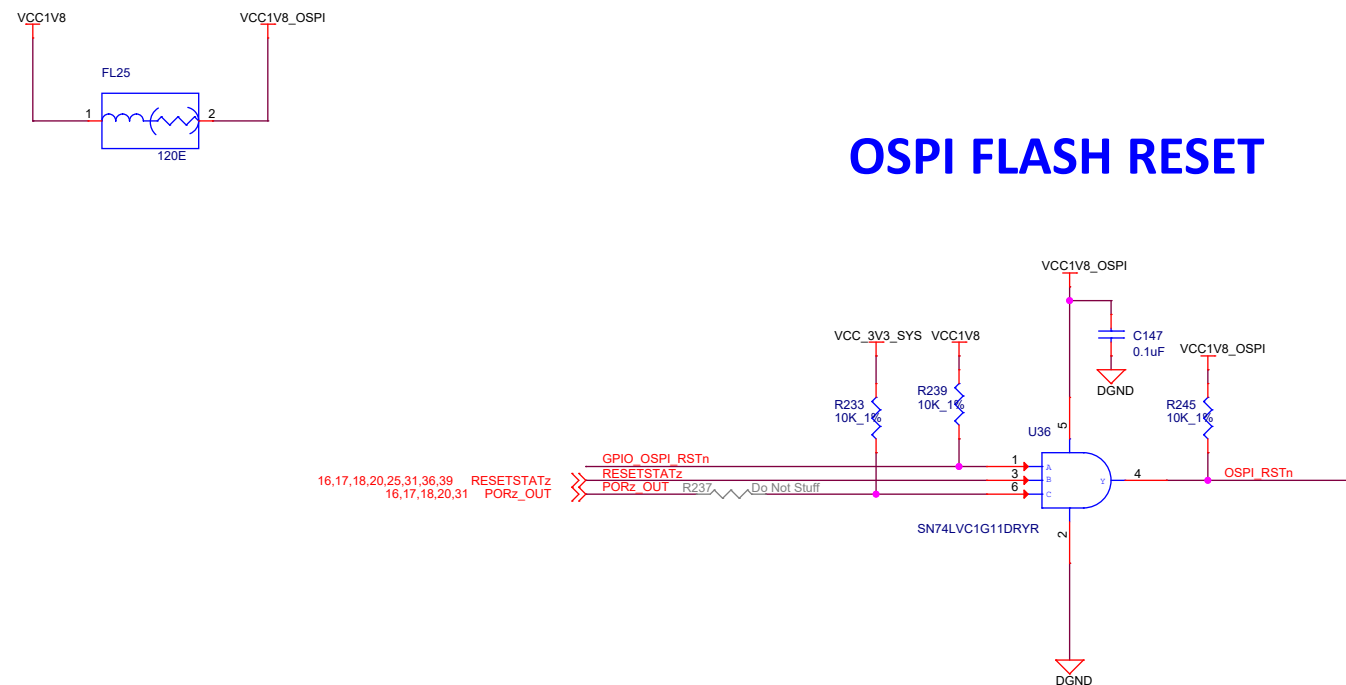
OSPI FLASH



SOC OSPI INTERFACE

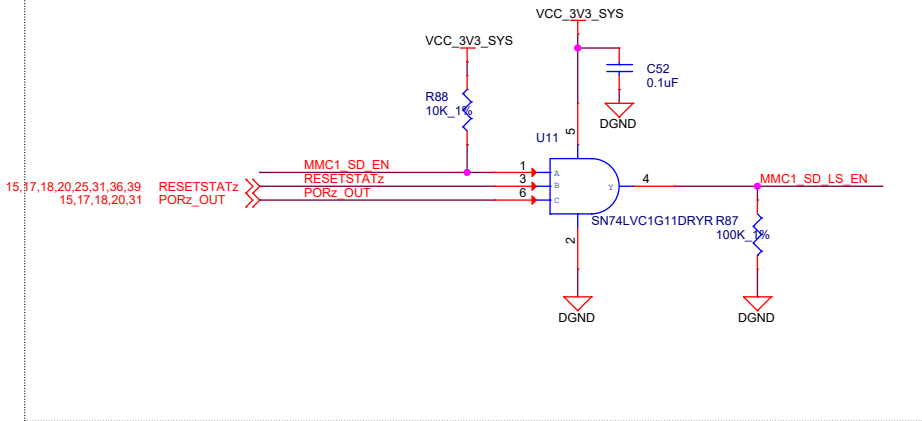


OSPI FLASH RESET

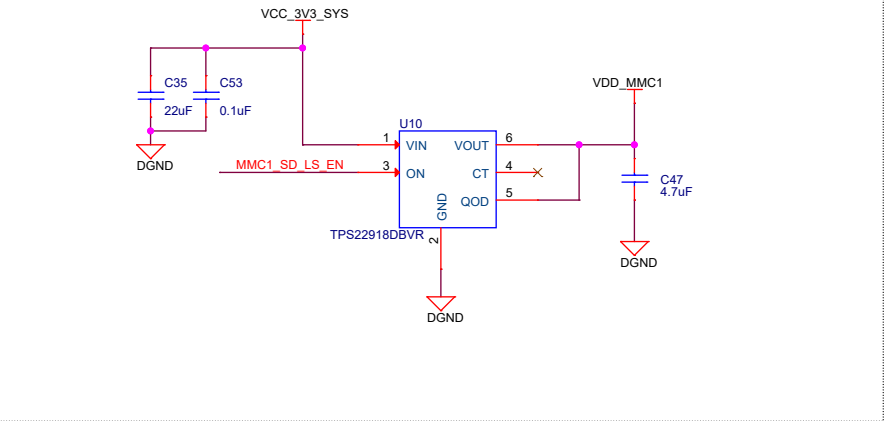


SD CARD INTERFACE

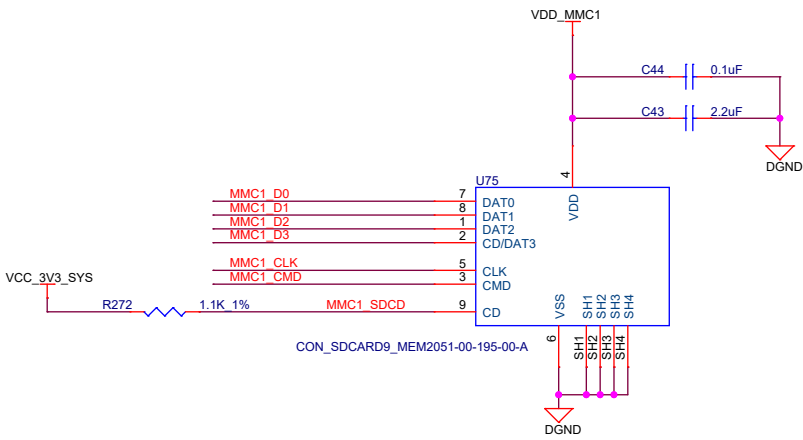
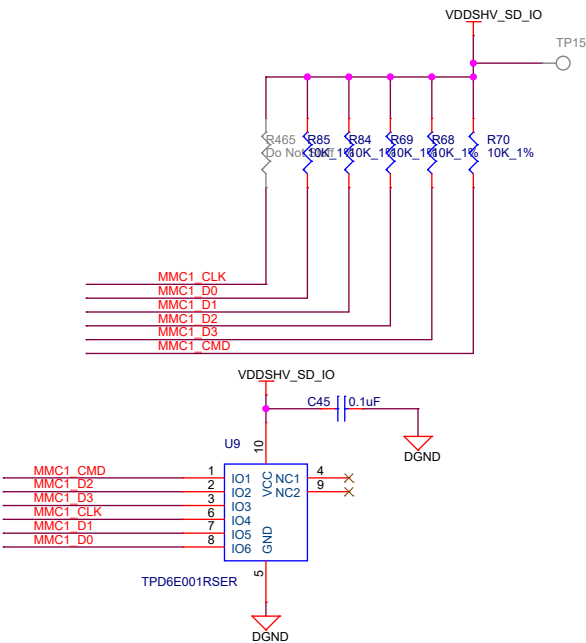
SD CARD RESET



POWER SWITCH



SD CARD CONNECTOR



OFF PAGE CONNECTIONS

14	MMC1_CLK	MMC1_CLK
36	MMC1_SD_EN	MMC1_SD_EN
14	MMC1_D0	MMC1_D0
14	MMC1_D1	MMC1_D1
14	MMC1_D2	MMC1_D2
14	MMC1_D3	MMC1_D3
14,16	MMC1_CMD	MMC1_CMD
14	MMC1_SDCD	MMC1_SDCD

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Title SDCARD INTERFACE

Size PROC100A 002

Date: Thursday, September 15, 2022

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Rev

A

PHY ADDRESS = 00000
 Auto-negotiation Enabled
 10/100/1000 advertised, Auto-MDI-X
 Tx Clock Skew = 0ns
 Rx Clock Skew = 2ns
 Refer 44 page for strap configuration

VCC_3V3_SYS

DGND

R244 Do Not Stuff

R252 Do Not Stuff

R49 5.76K_1%

R54 10K_1%

R51 Do Not Stuff

R50 Do Not Stuff

R61 Do Not Stuff

R42 Do Not Stuff

R46 Do Not Stuff

R262 2.49K_1%

R53 2.49K_1%

R52 Do Not Stuff

R261 Do Not Stuff

R60 Do Not Stuff

CPSW_RGMII1_RD0

CPSW_RGMII1_RD2

CPSW_RGMII1_RX_CTL

CPSW_ETH1_LED_1000

CPSW_ETH1_LED_ACT

CPSW_ETH1_GPIO_0

CPSW_ETH1_GPIO_1

VCC_3V3_SYS

TP10

R27

R26

R48

R31

DGND

VCC_3V3_SYS

R215 220E

CPSW_ETH1_LED2

Q5

CSD16301Q2

R265 0E

DGND

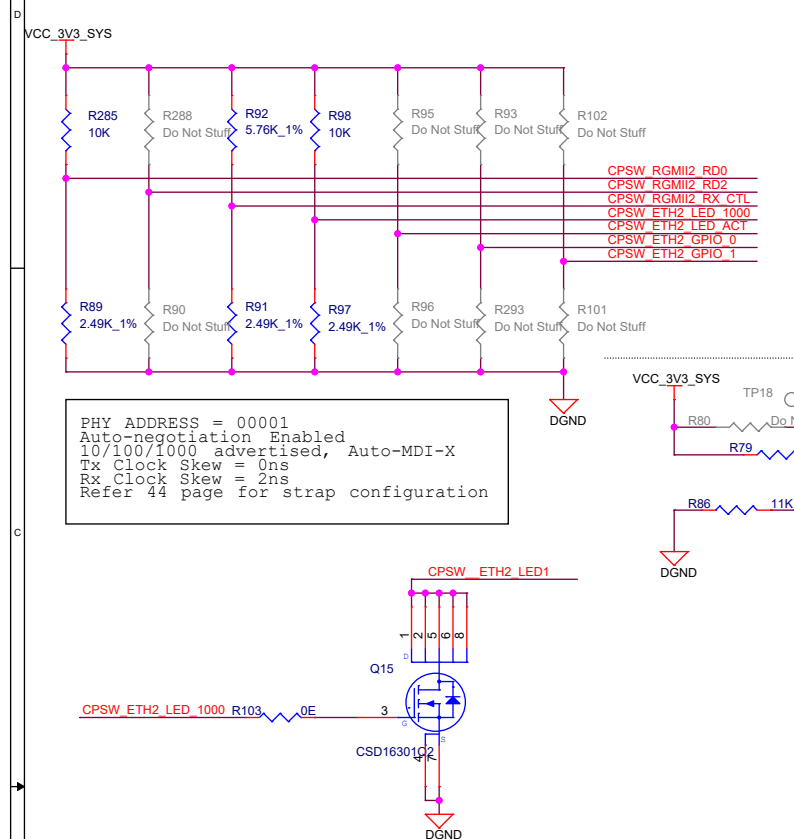
[illegible]

The image displays three circuit diagrams illustrating the placement of decoupling capacitors for different power supply rails. Each diagram shows a series of capacitors connected to the rail and ground.

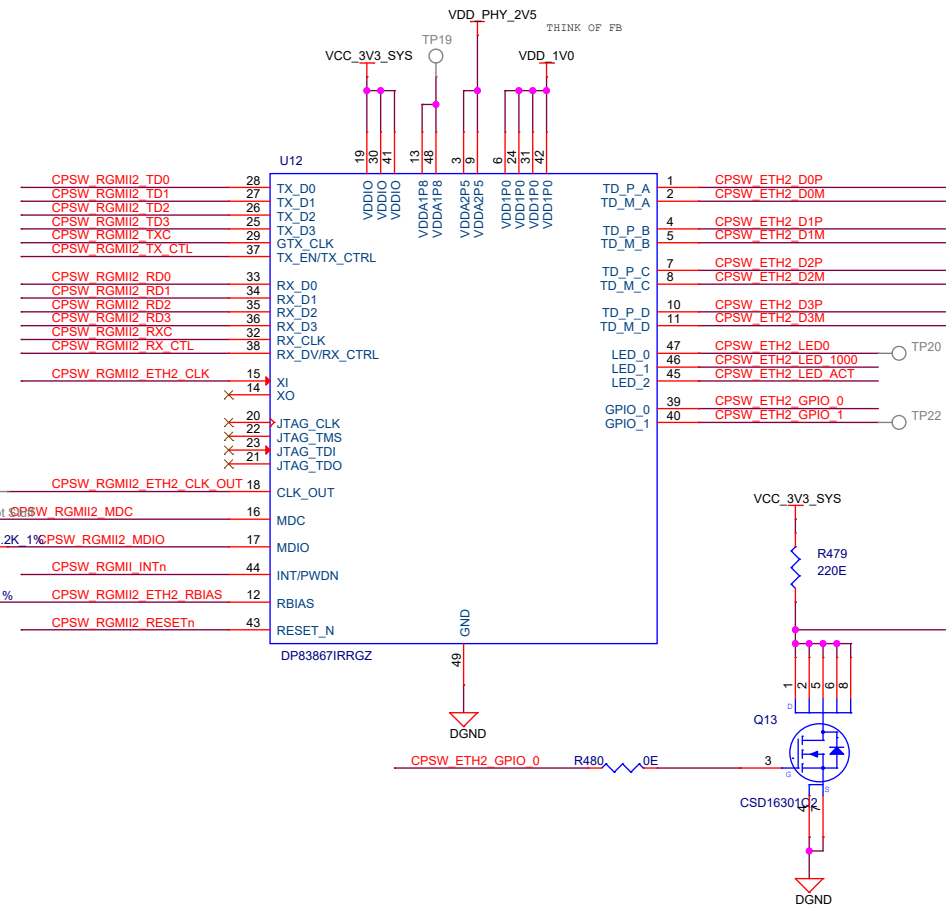
- VDD_1V0:** This diagram shows a series of capacitors (C23, C29, C13, C24, C156, C146, C145, C135, C14) connected to the VDD_1V0 rail and ground. The capacitors are labeled with their values: 0.1uF, 0.1uF, 0.1uF, 0.1uF, 1uF, 1uF, 1uF, 1uF, and 10uF.
- VCC_3V3_SYS:** This diagram shows a series of capacitors (C28, C19, C14, C157, C140, C134, C131) connected to the VCC_3V3_SYS rail and ground. The capacitors are labeled with their values: 0.1uF, 0.1uF, 0.1uF, 1uF, 1uF, 1uF, and 10uF.
- VDD_PHY_2V5:** This diagram shows a series of capacitors (C17, C27, C138, C152, C137) connected to the VDD_PHY_2V5 rail and ground. The capacitors are labeled with their values: 0.1uF, 0.1uF, 1uF, 1uF, and 4.7uF.

25	CPSW RGMII1 RD0	CPSW RGMII1 RD0
25	CPSW RGMII1 RD1	CPSW RGMII1 RD1
25	CPSW RGMII1 RD2	CPSW RGMII1 RD2
25	CPSW RGMII1 RD3	CPSW RGMII1 RD3
25	CPSW RGMII1 RXC	CPSW RGMII1 RXC
25	CPSW RGMII1 RXC	CPSW RGMII1 RX CTL
25	CPSW RGMII1 RX CTL	CPSW RGMII1 TD0
25	CPSW RGMII1 TD0	CPSW RGMII1 TD1
25	CPSW RGMII1 TD1	CPSW RGMII1 TD2
25	CPSW RGMII1 TD2	CPSW RGMII1 TD3
25	CPSW RGMII1 TD3	CPSW RGMII1 TX CTL
25	CPSW RGMII1 TX CTL	CPSW RGMII1 TXC
25	CPSW RGMII1 TXC	Porz OUT
15,16,18,20,31	Porz OUT	CPSW RGMII1 INTnPRU INTn
25,31,39	CPSW RGMII1 INTnPRU INTn	CPSW RGMII1 ETH1 CLK
17,36	GPIO CPSW1 RST	CPSW RGMII2 MDIO
29	CPSW RGMII1 ETH1 CLK	CPSW RGMII2 MDIO
18,25	CPSW RGMII1 MDIO	CPSW RGMII1 INTn
18,25	CPSW RGMII2 MDIO	
18	CPSW RGMII1 INTn	

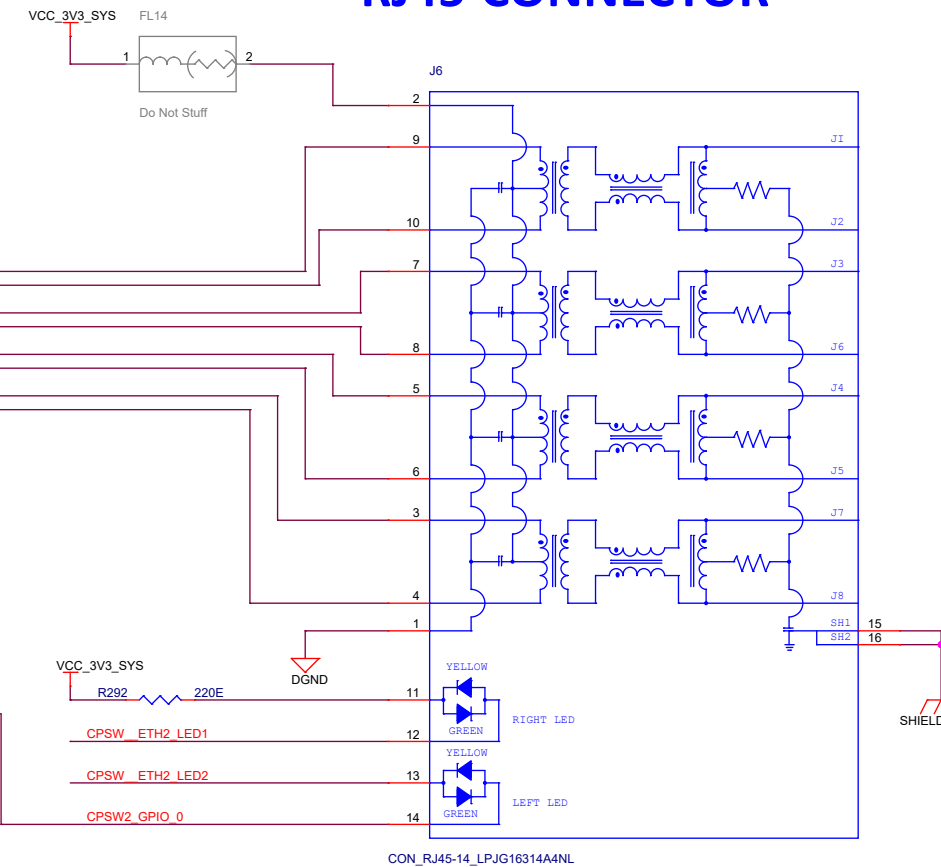
STRAPPING RESISTORS



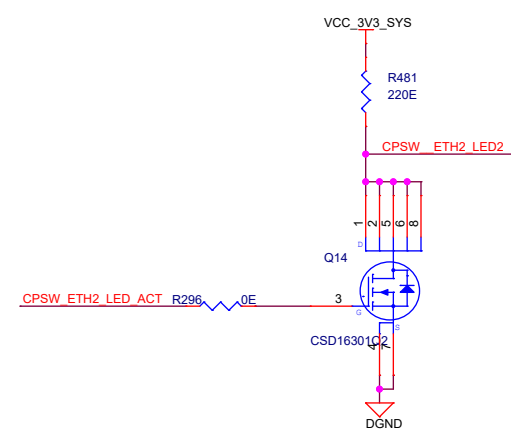
CPSW RGMII 2 - PHY



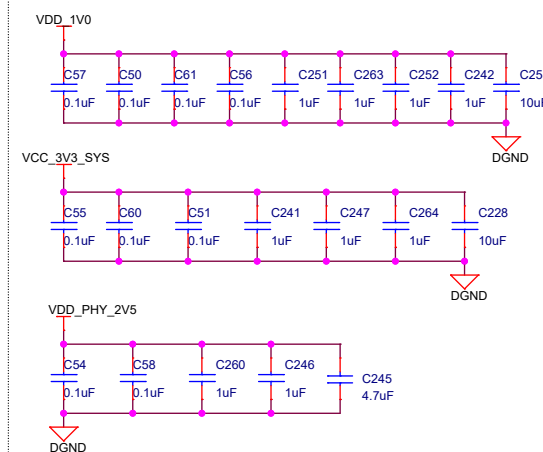
RJ45 CONNECTOR



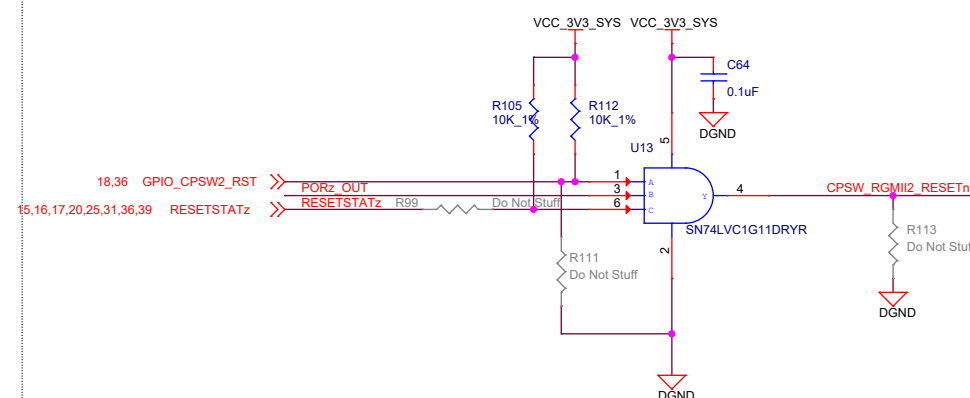
CPSW PHY-2 SPEED AND ACTIVITY LED's DRIVERS



DECAPS



CPSW PHY-2 RESET



OFF PAGE CONNECTIONS

25	CPSW_RGMII2_RD0	CPSW_RGMII2_RD0
25	CPSW_RGMII2_RD1	CPSW_RGMII2_RD1
25	CPSW_RGMII2_RD2	CPSW_RGMII2_RD2
25	CPSW_RGMII2_RD3	CPSW_RGMII2_RD3
25	CPSW_RGMII2_RXC	CPSW_RGMII2_RXC
25	CPSW_RGMII2_RX_CTL	CPSW_RGMII2_RX_CTL
25	CPSW_RGMII2_TD0	CPSW_RGMII2_TD0
25	CPSW_RGMII2_TD1	CPSW_RGMII2_TD1
25	CPSW_RGMII2_TD2	CPSW_RGMII2_TD2
25	CPSW_RGMII2_TD3	CPSW_RGMII2_TD3
25	CPSW_RGMII2_TXC	CPSW_RGMII2_TXC
25	CPSW_RGMII2_TX_CTL	CPSW_RGMII2_TX_CTL
15,16,17,20,31	PORz_OUT	PORz_OUT
18,36	GPIO_CPSW2_RST	GPIO_CPSW2_RST
29	CPSW_RGMII2_ETH2_CLK	CPSW_RGMII2_ETH2_CLK
17,25	CPSW_RGMII2_MDC	CPSW_RGMII2_MDC
17,25	CPSW_RGMII2_MDIO	CPSW_RGMII2_MDIO
17	CPSW_RGMII2_INTn	CPSW_RGMII2_INTn

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Title CPSW_RGMII2_2 ETHERNET PHY

Size PROC100A 002

C

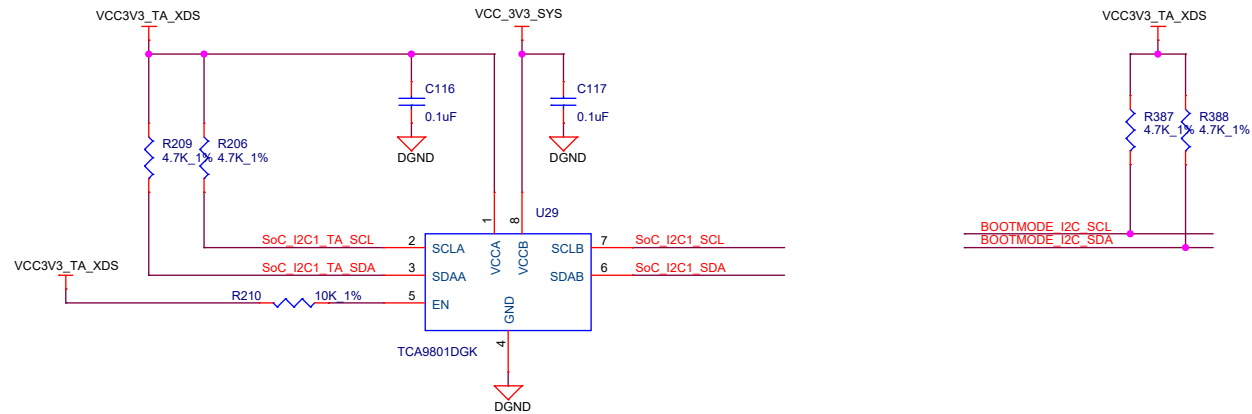
Date: Thursday, September 15, 2022

Sheet 18 of 43

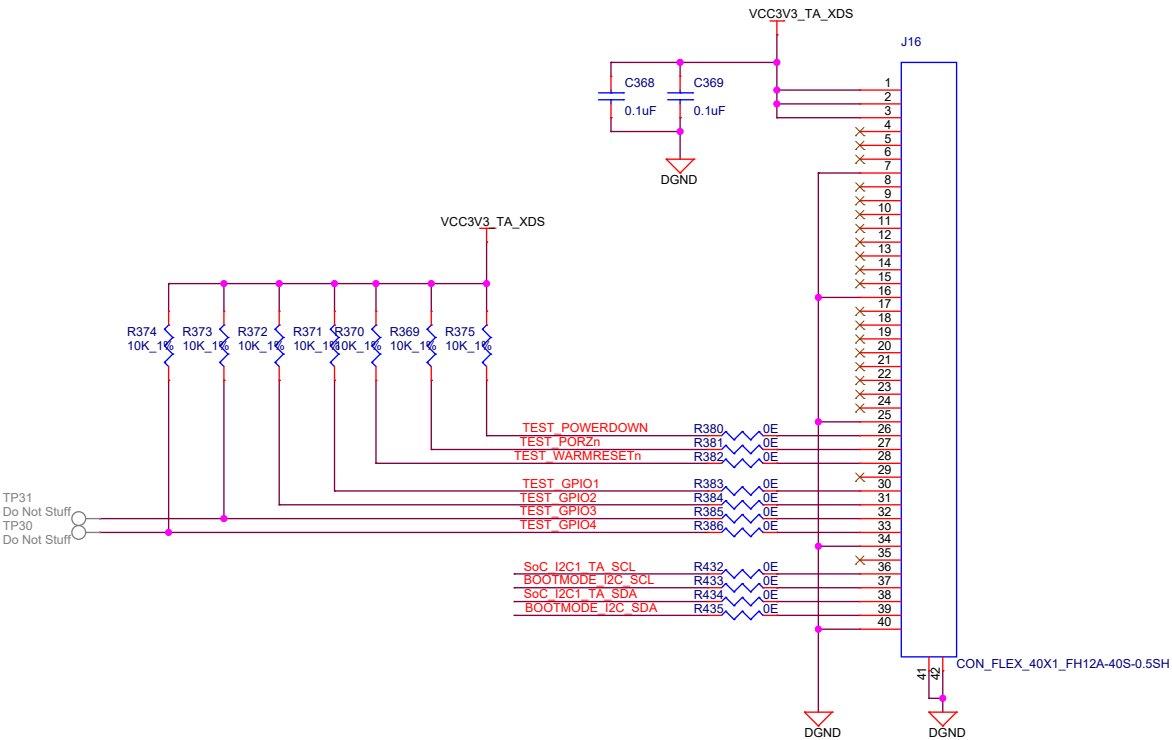
Rev

A

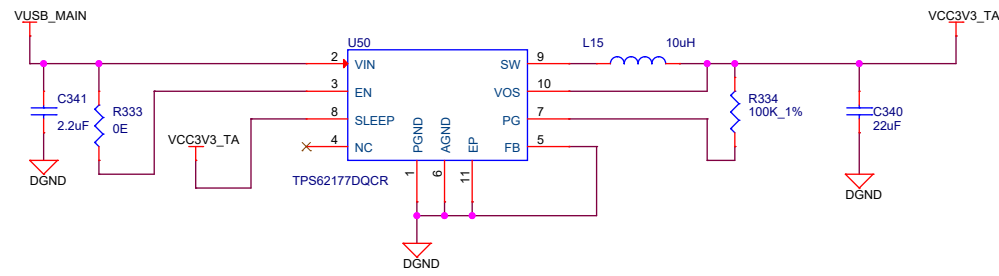
I2C BUS BUFFER



40-PIN AUTOMATION HEADER



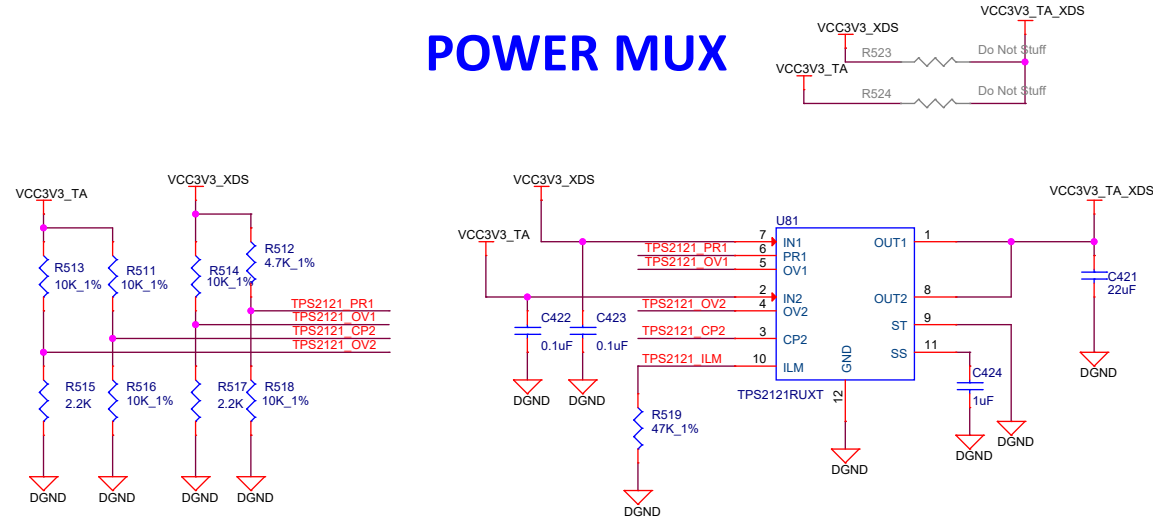
TEST AUTOMATION BOARD POWER



TEST AUTOMATION GPIO MAPPING

SIGNAL NAME	DESCRIPTION	Direction WRT CTRL	Internal/ External PU/PD states
TEST_POWERDOWN	Used to Power down the OVP Circuit	OUTPUT	External Pullup
TEST_PORZn	Used to Reset the SoC PORz	OUTPUT	External Pullup
TEST_WARMRESETn	Used to Reset the SoC Warmreset	OUTPUT	External Pullup
TEST_GPIO1	Used to Generate the interrupt on GPIO1_59_INTn Pin	OUTPUT	External Pullup
TEST_GPIO2	Connected to SoC GPIO to Communicate	OUTPUT	External Pullup
TEST_GPIO3	Used to Enable the BOOTMODE Buffer	OUTPUT	External Pullup
TEST_GPIO4	Used to Reset the Bootmode IO Expander	OUTPUT	External Pullup

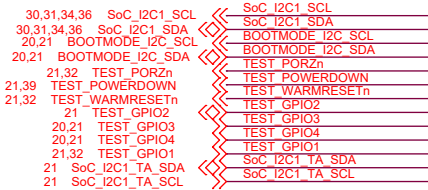
POWER MUX



Note: When IN1 drops below 2.425V, then IN2 is used.
Over voltage protection: OV1 & OV2 : 5.878V

Design Specifications	
VPR1	2.2V
VCP2	1.65V
VOV1	0.3V
VOV2	0.3V

OFF PAGE CONNECTIONS

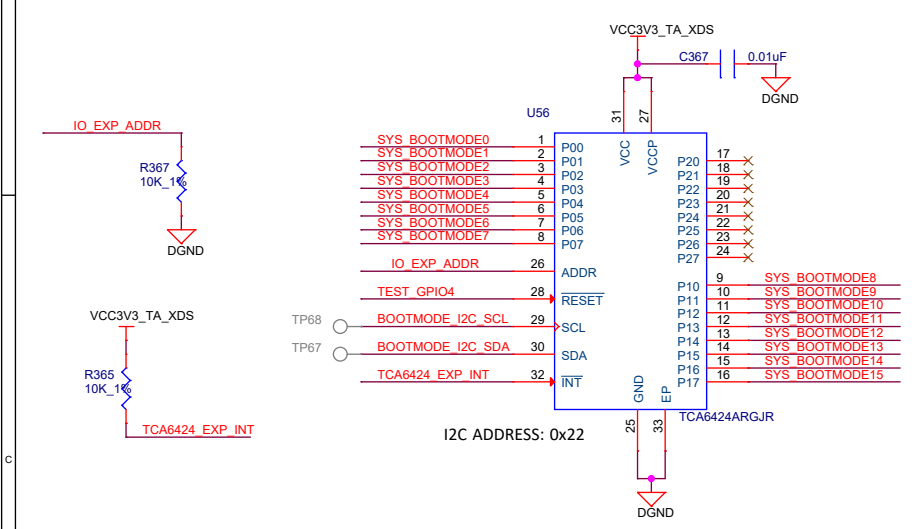


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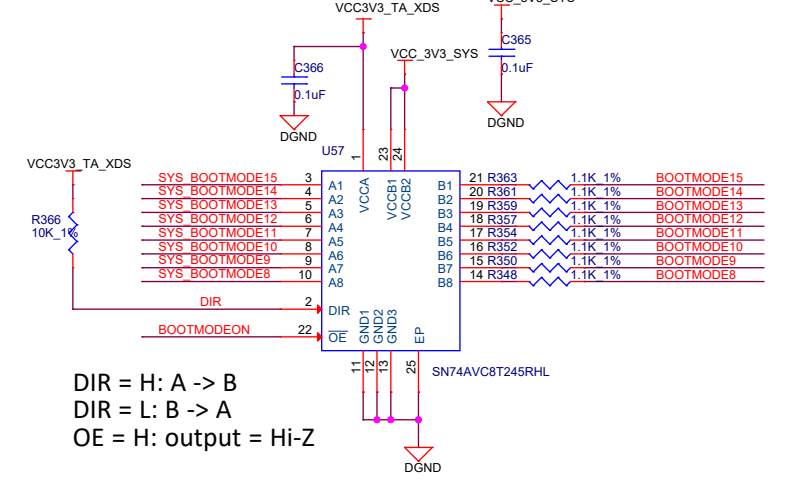
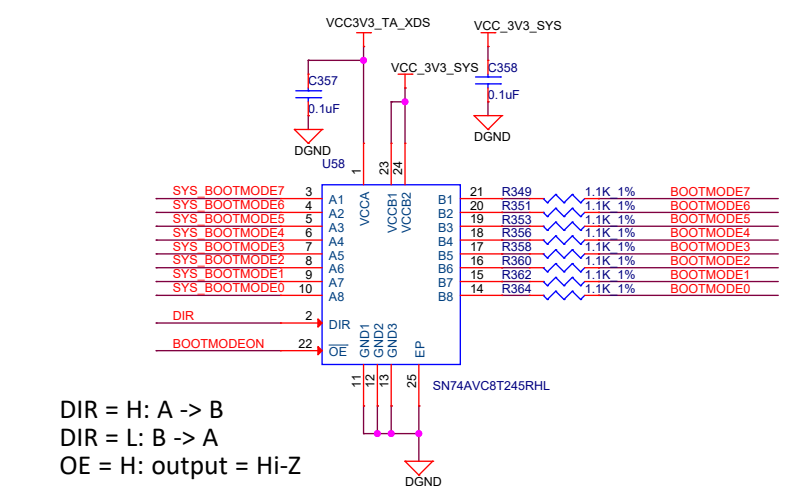


Title TEST AUTOMATION	
Size	PROC100A 002
C	Rev A
Date: Thursday, June 13, 2024	Sheet 19 of 43

IO EXPANDER

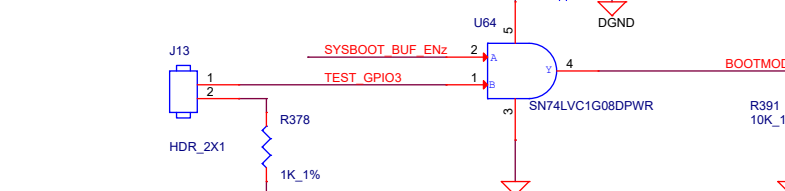
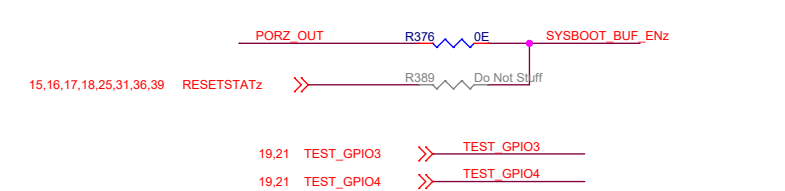


BOOT MODE BUFFER

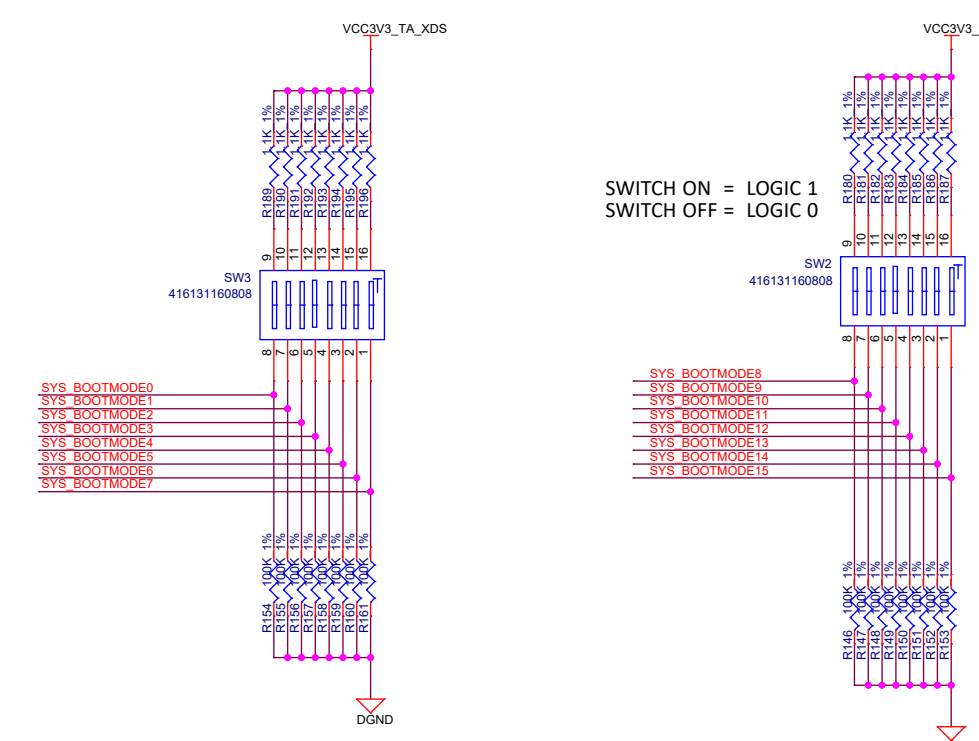


DIR = H: A -> B
DIR = L: B -> A
OE = H: output = Hi-Z

DIR = H: A -> B
DIR = L: B -> A
OE = H: output = Hi-Z

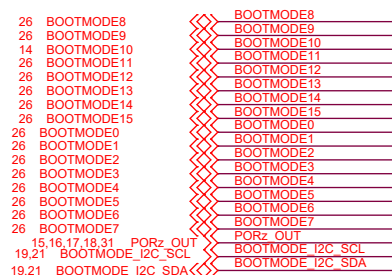


BOOT MODE SWITCHES



SWITCH ON = LOGIC 1
SWITCH OFF = LOGIC 0

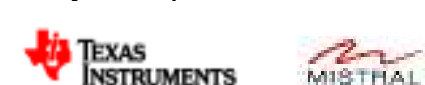
OFF PAGE CONNECTIONS



BOOT MODES SUPPORTED

- 1. OSPI
 - 2. MMC1 - SD CARD
 - 3. CPSW Ethernet
 - 4. USB Device
 - 5. Ethernet
- MCU Boot Mode Pins to be Finalized

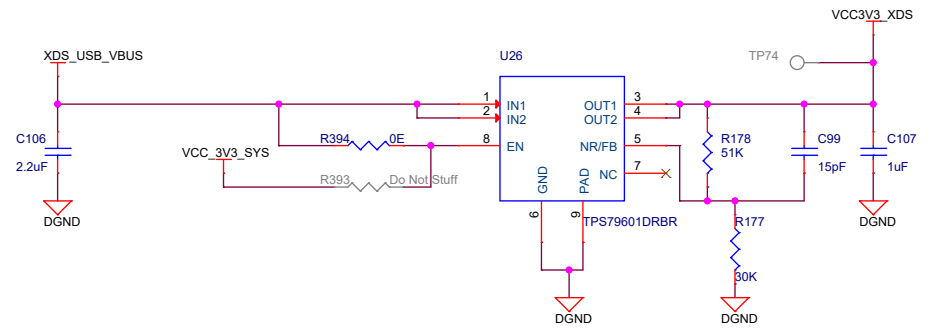
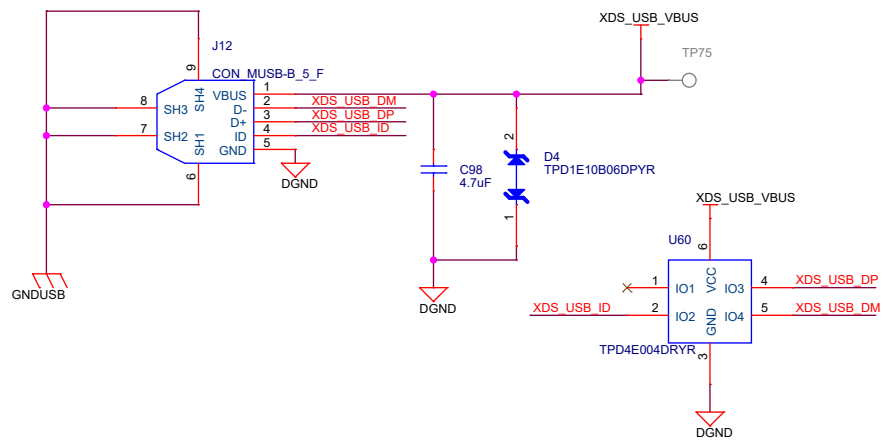
Designed for TI by Mistral Solutions Pvt Ltd



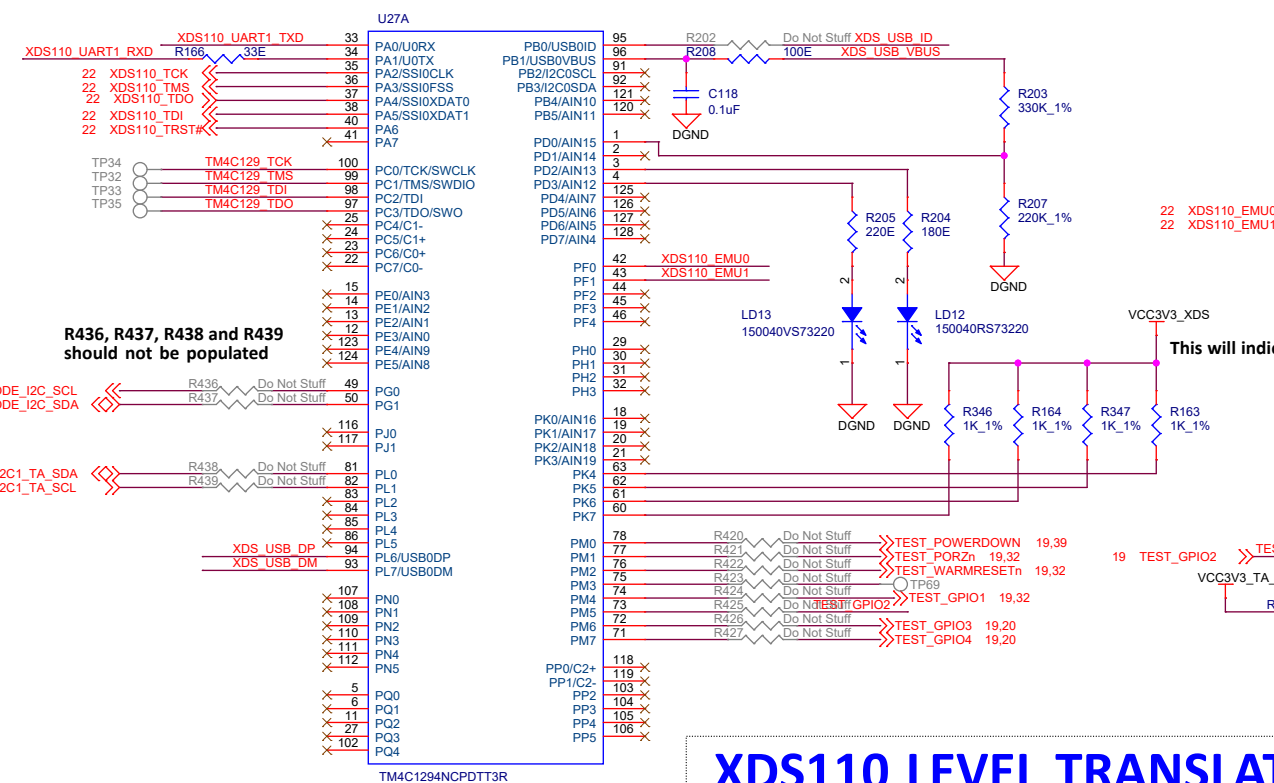
Title			Rev	
BOOT MODE BUFFER & SWITCHES			A	
Size	PROC100A 002			
C				
Date:	Thursday, September 15, 2022	Sheet	20	of 43

XDS110 POWER

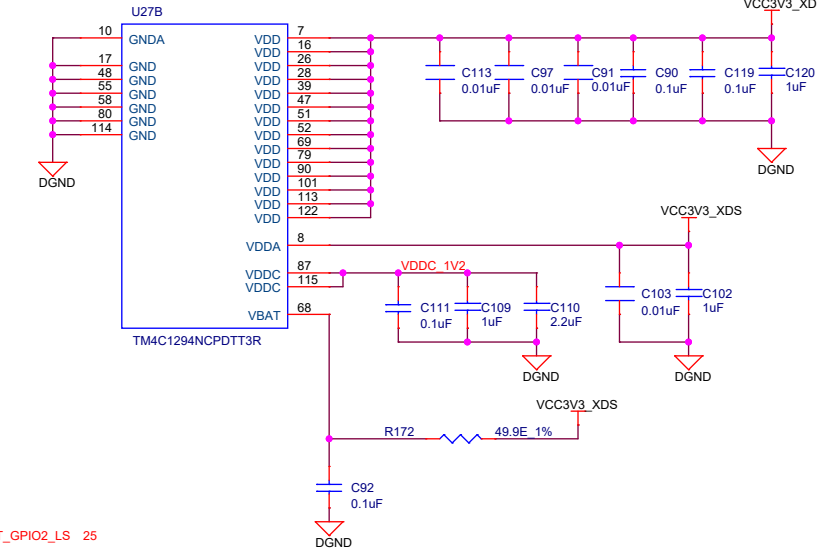
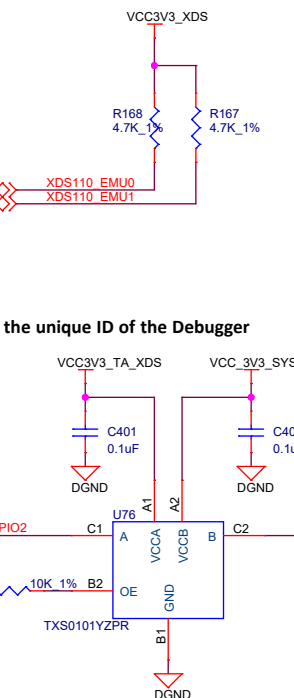
USB Connector



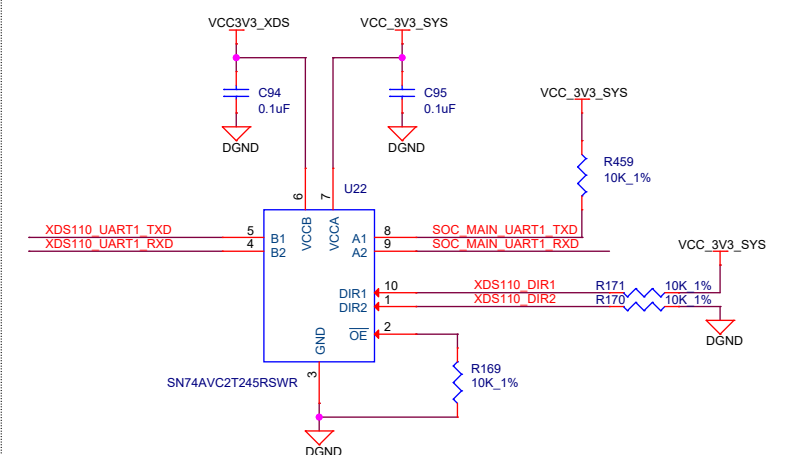
XDS110 DEBUGGER



This will indicate the unique ID of the Debugger



XDS110 LEVEL TRANSLATOR



OFF PAGE CONNECTIONS

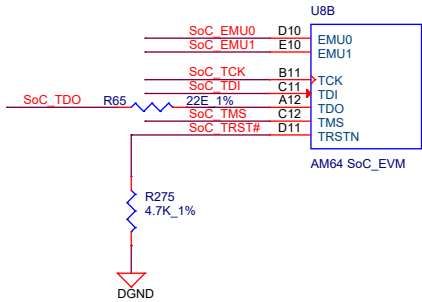


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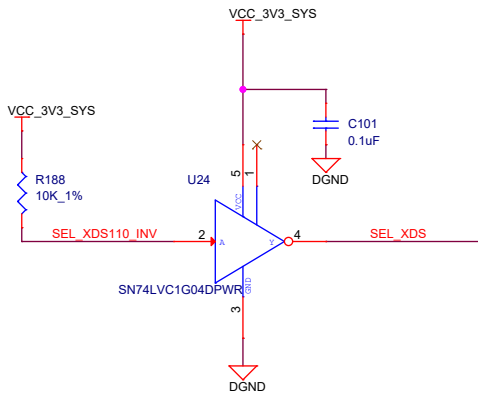


Title XDS110 DEBUGGER		
Size	PROC100A 002	Rev
C		A
Date:	Thursday, September 15, 2022	Sheet 21 of 43

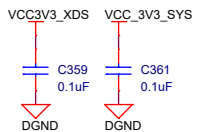
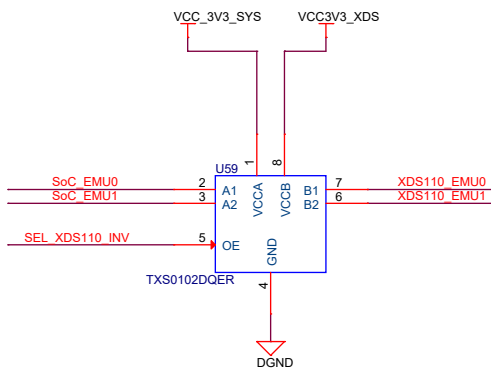
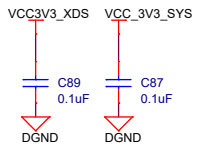
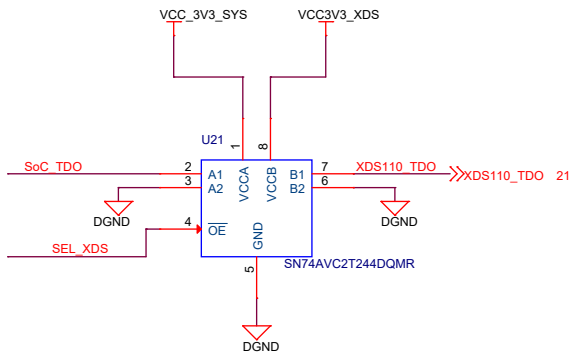
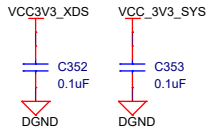
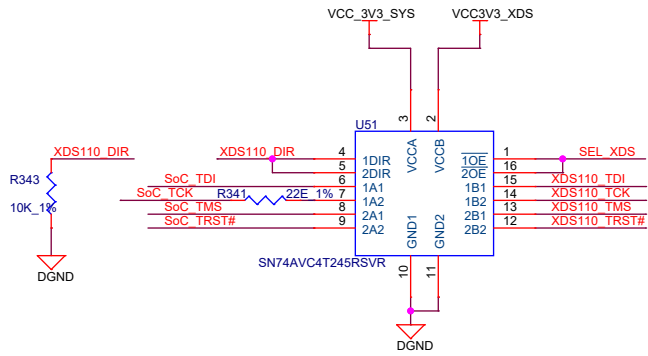
JTAG SoC SECTION



INVERTER



BUFFER XDS110



OFF PAGE CONNECTIONS

23	SEL_XDS110_INV	SEL_XDS110_INV
21	XDS110_TDI	XDS110_TDI
21	XDS110_TCK	XDS110_TCK
21	XDS110_TMS	XDS110_TMS
21	XDS110_TRST#	XDS110_TRST#
21	SoC_TDO	SoC_TDO
23	SoC_TDI	SoC_TDI
23	SoC_TCK	SoC_TCK
23	SoC_TMS	SoC_TMS
21	XDS110_EMU0	XDS110_EMU0
21	XDS110_EMU1	XDS110_EMU1
21	SEL_XDS	SEL_XDS
23	SoC_EMU0	SoC_EMU0
23	SoC_EMU1	SoC_EMU1
23	SoC_TRST#	SoC_TRST#

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Title JTAG BUFFER

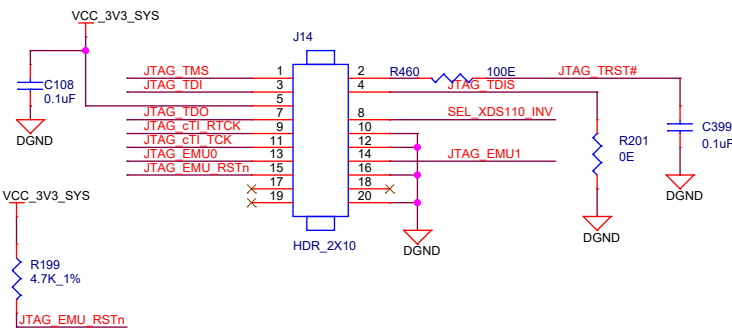
Size PROC100A 002

Date: Thursday, September 15, 2022

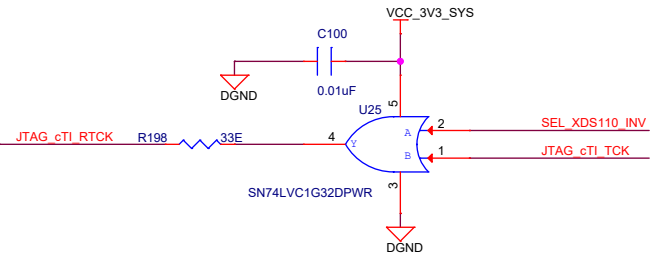
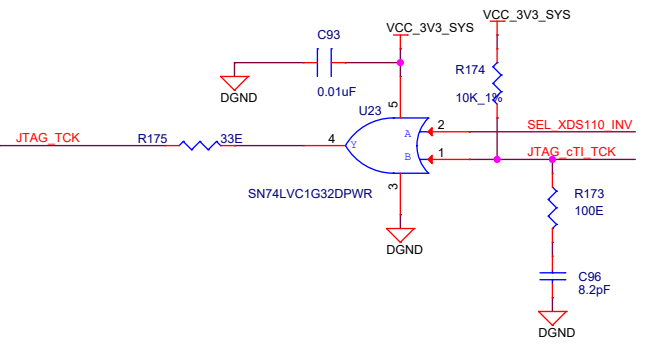
Sheet 22 of 43

Rev A

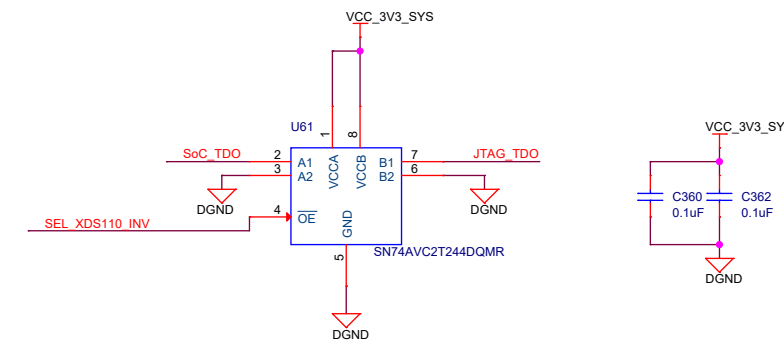
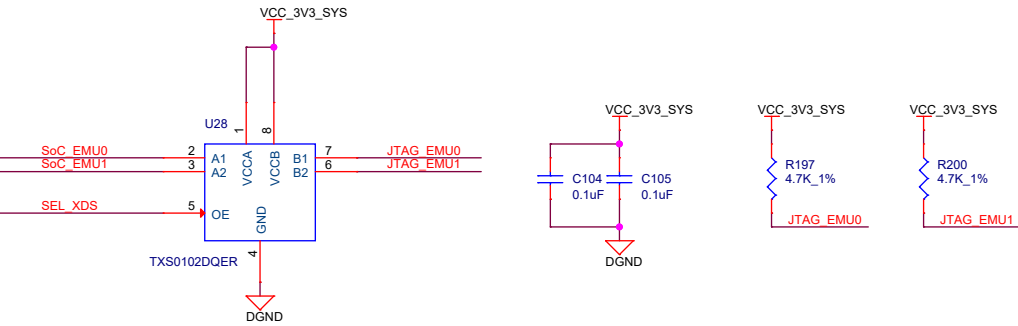
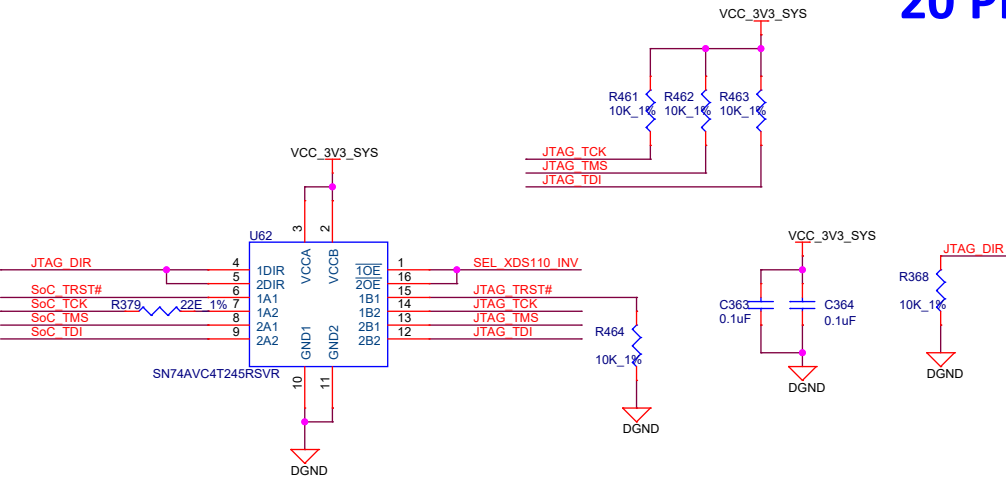
JTAG 20 PIN cTI CONNECTOR



JTAG CLOCK BUFFER



20 PIN JTAG BUFFERS



OFF PAGE CONNECTIONS

22 SEL_XDS110_INV	SEL_XDS110_INV
22 SoC_TDO	SoC_TDO
22 SoC_TDI	SoC_TDI
22 SoC_TCK	SoC_TCK
22 SoC_TMS	SoC_TMS
22 SoC_TRST#	SoC_TRST#
22 JTAG_EMU_RSTn	JTAG_EMU_RSTn
22 SEL_XDS	SEL_XDS
22 SoC_EMU0	SoC_EMU0
22 SoC_EMU1	SoC_EMU1

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Title JTAG 20 PIN cTI CONNECTOR

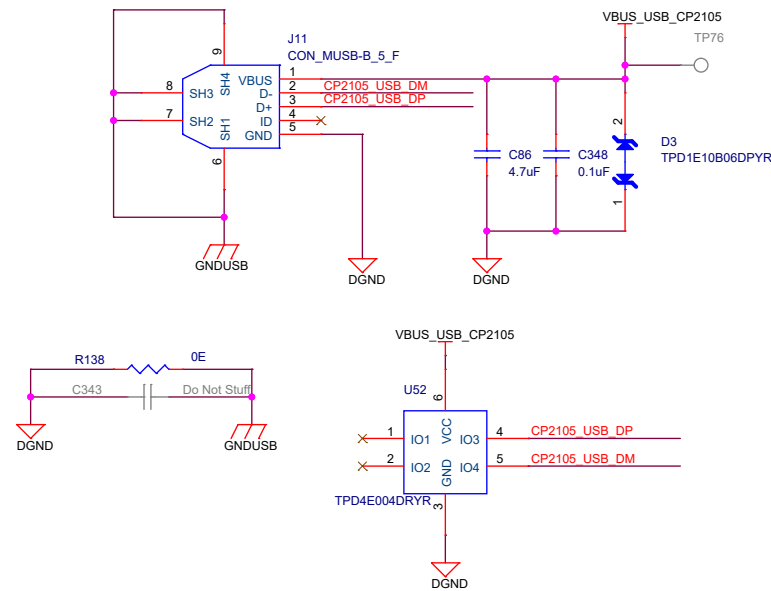
Size PROC100A 002

Rev A

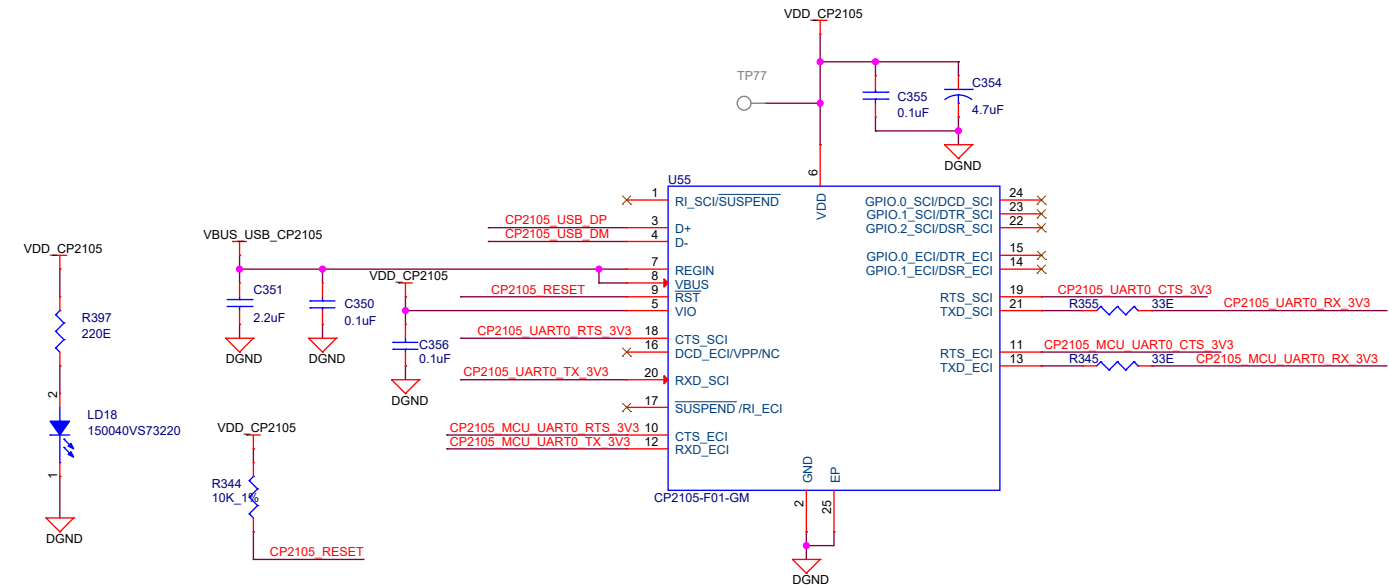
Date: Thursday, September 15, 2022

Sheet 23 of 43

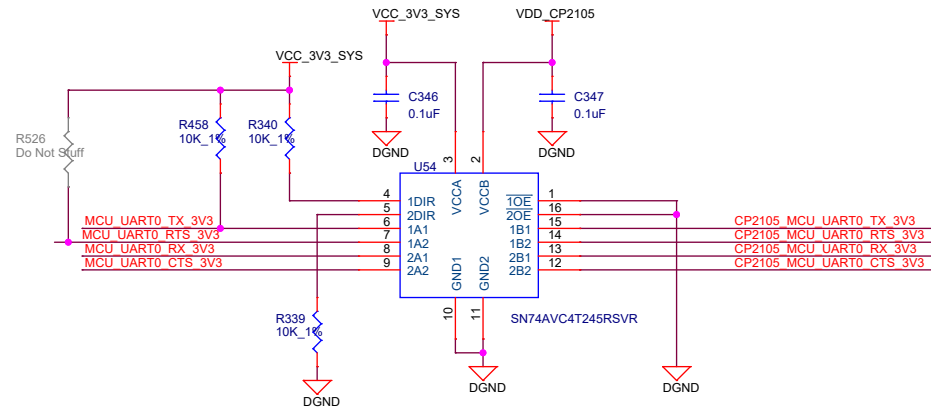
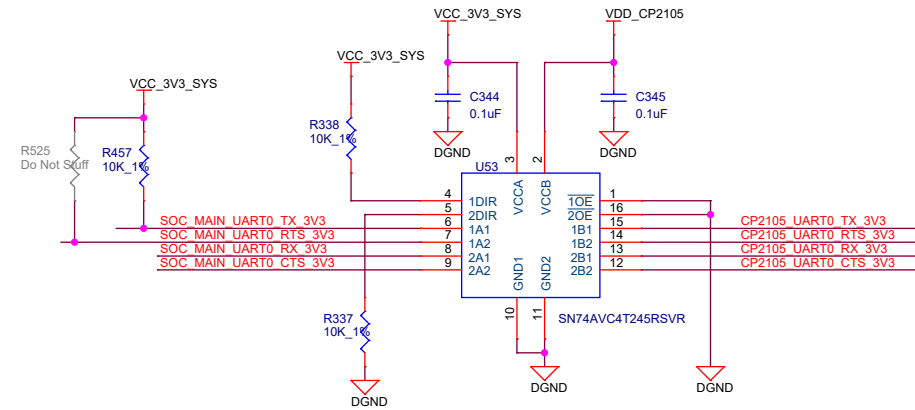
USB Micro B CONNECTOR



USB TO DUAL UART BRIDGE



CP2105 LEVEL TRANSLATOR



OFF PAGE CONNECTIONS

SOC_MAIN_UART0_RX_3V3	SOC_MAIN_UART0_RX_3V3	31
SOC_MAIN_UART0_TX_3V3	SOC_MAIN_UART0_TX_3V3	31
SOC_MAIN_UART0_RTS_3V3	SOC_MAIN_UART0_RTS_3V3	31
SOC_MAIN_UART0_CTS_3V3	SOC_MAIN_UART0_CTS_3V3	31
MCU_UART0_RX_3V3	MCU_UART0_RX_3V3	31
MCU_UART0_TX_3V3	MCU_UART0_TX_3V3	31
MCU_UART0_RTS_3V3	MCU_UART0_RTS_3V3	31
MCU_UART0_CTS_3V3	MCU_UART0_CTS_3V3	31

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Title CP2105 UART TO USB BRIDGE

Size PROC100A 002

Date: Thursday, September 15, 2022

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Rev A

VCC_3V3 SYS

R289 2.2K 1%RG0 MDIO0 MDIO

U8K

U8L

TP16

TP17

Y6

AA6

PRG0_MDIO0_MDC

PRG0_MDIO0_MDIO

PRG0_PRUI0GP00

PRG0_PRUI0GP01

PRG0_PRUI0GP02

PRG0_PRUI0GP03

PRG0_PRUI0GP04

PRG0_PRUI0GP05

PRG0_PRUI0GP06

PRG0_PRUI0GP07

PRG0_PRUI0GP08

PRG0_PRUI0GP09

PRG0_PRUI0GP010

PRG0_PRUI0GP011

PRG0_PRUI0GP012

PRG0_PRUI0GP013

PRG0_PRUI0GP014

PRG0_PRUI0GP015

PRG0_PRUI0GP016

PRG0_PRUI0GP017

PRG0_PRUI0GP018

PRG0_PRUI0GP019

PRG0_PRUI1GP00

PRG0_PRUI1GP01

PRG0_PRUI1GP02

PRG0_PRUI1GP03

PRG0_PRUI1GP04

PRG0_PRUI1GP05

PRG0_PRUI1GP06

PRG0_PRUI1GP07

PRG0_PRUI1GP08

PRG0_PRUI1GP09

PRG0_PRUI1GP010

PRG0_PRUI1GP011

PRG0_PRUI1GP012

PRG0_PRUI1GP013

PRG0_PRUI1GP014

PRG0_PRUI1GP015

PRG0_PRUI1GP016

PRG0_PRUI1GP017

PRG0_PRUI1GP018

PRG0_PRUI1GP019

CPSW_RGMII2_MDIO

CPSW_RGMII2_MDC

PRG1_MDIO0_MDC

PRG1_MDIO0_MDIO

VSEL SD_SWITCH

WLAN IRQ LS

WLAN EN SoC LS

BT EN SoC LS

CPSW_RGMIIH_RX_CTL

PMIC TEST

TEST GPIO2 LS

CPSW_RGMIIH_RXC

CPSW_RGMIIH_TX_CTL

CPSW_RGMIIH_TXC

TEST_LED1

COM8 LS_EN

BTUART_RTS_SEL

PRU_3V3 En

CPSW_RGMII2_RD0

CPSW_RGMII2_RD1

CPSW_RGMII2_RD2

CPSW_RGMII2_RD3

CPSW_RGMII2_RX_CTL

CPSW_RGMIIH_RD0

CPSW_RGMII2_RXC

CPSW_RGMIIH_RD1

CPSW_RGMIIH_T0

CPSW_RGMIIH_T1

CPSW_RGMIIH_T2

CPSW_RGMII2_TD0

CPSW_RGMII2_TD1

CPSW_RGMII2_TD2

CPSW_RGMII2_TD3

CPSW_RGMII2_TXC

CPSW_RGMIIH_T03

CPSW_RGMIIH_RD2

CPSW_RGMIIH_RD3

Y7

U8

W8

V8

Y8

A13

OE

U13

W13

U15

U14

AA8

U9

AA9

U9

V7

W7

W11

V11

AA12

Y12

AA13

U11

V15

U12

V16

V14

W14

AA10

V10

U10

AA11

Y11

Y10

AA14

Y13

V12

PRG1_PRUI0_GP00

PRG1_PRUI0_GP01

PRG1_PRUI0_GP02

PRG1_PRUI0_GP03

PRG1_PRUI0_GP04

PRG1_PRUI0_GP05

PRG1_PRUI0_GP06

PRG1_PRUI0_GP07

PRG1_PRUI0_GP08

PRG1_PRUI0_GP09

PRG1_PRUI0_GP010

PRG1_PRUI0_GP011

PRG1_PRUI0_GP012

PRG1_PRUI0_GP013

PRG1_PRUI0_GP014

PRG1_PRUI0_GP015

PRG1_PRUI0_GP016

PRG1_PRUI0_GP017

PRG1_PRUI0_GP018

PRG1_PRUI0_GP019

PRG1_PRUI1_GP00

PRG1_PRUI1_GP01

PRG1_PRUI1_GP02

PRG1_PRUI1_GP03

PRG1_PRUI1_GP04

PRG1_PRUI1_GP05

PRG1_PRUI1_GP06

PRG1_PRUI1_GP07

PRG1_PRUI1_GP08

PRG1_PRUI1_GP09

PRG1_PRUI1_GP010

PRG1_PRUI1_GP011

PRG1_PRUI1_GP012

PRG1_PRUI1_GP013

PRG1_PRUI1_GP014

PRG1_PRUI1_GP015

PRG1_PRUI1_GP016

PRG1_PRUI1_GP017

PRG1_PRUI1_GP018

PRG1_PRUI1_GP019

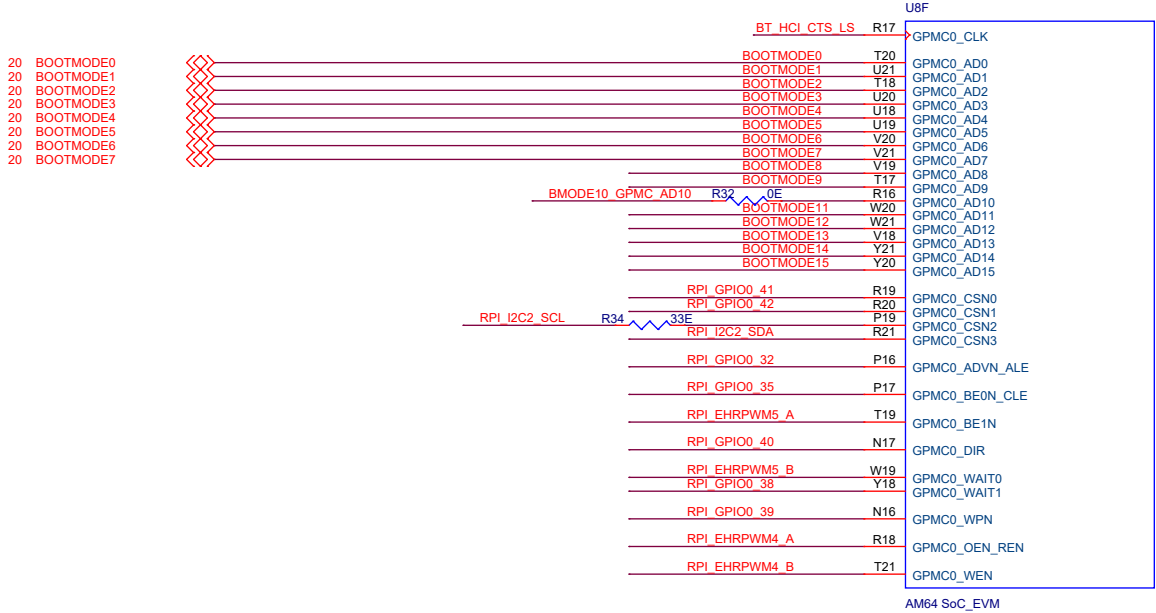
[illegible]

27,31	MCU_RESESTATZ	MCU_RESESTATZ
17	CPSW_RGMII1_R0	CPSW_RGMII1_R0
17	CPSW_RGMII1_RD0	CPSW_RGMII1_RD1
17	CPSW_RGMII1_RD1	CPSW_RGMII1_RD2
17	CPSW_RGMII1_RD2	CPSW_RGMII1_RD3
17	CPSW_RGMII1_RXC	CPSW_RGMII1_RXC
17	CPSW_RGMII1_RX_CTL	CPSW_RGMII1_RX_CTL
17	CPSW_RGMII1_RX_CTL	CPSW_RGMII2_R0
18	CPSW_RGMII2_R0	CPSW_RGMII2_RD1
18	CPSW_RGMII2_RD1	CPSW_RGMII2_RD2
18	CPSW_RGMII2_RD2	CPSW_RGMII2_RD3
18	CPSW_RGMII2_RD3	CPSW_RGMII2_RXC
18	CPSW_RGMII2_RXC	CPSW_RGMII2_RX_CTL
18	CPSW_RGMII2_RX_CTL	CPSW_RGMII2_T0
18	CPSW_RGMII2_T0	CPSW_RGMII2_TD1
18	CPSW_RGMII2_TD1	CPSW_RGMII2_TD2
18	CPSW_RGMII2_TD2	CPSW_RGMII2_TD3
18	CPSW_RGMII2_TD3	CPSW_RGMII2_TXC
18	CPSW_RGMII2_TXC	CPSW_RGMII2_TX_CTL
18	CPSW_RGMII2_TX_CTL	CPSW_RGMII1_T0
17	CPSW_RGMII1_T0	CPSW_RGMII1_TD1
17	CPSW_RGMII1_TD1	CPSW_RGMII1_TD2
17	CPSW_RGMII1_TD2	CPSW_RGMII1_TD3
17	CPSW_RGMII1_TD3	CPSW_RGMII1_TX_CTL
17	CPSW_RGMII1_TXC	CPSW_RGMII1_TXC
36	PRU_DETECT	PRU_DETECT
17,31,39	CPSW_RGMII1nPRU_INTn	CPSW_RGMII1nPRU_INTn
15,16,17,18,20,31,36,39	RESESTATZ	RESESTATZ
14	WLAN_IRQ_LS	WLAN_IRQ_LS
14	WLAN_EN_SoC_LS	WLAN_EN_SoC_LS
14	BT_EN_SoC_LS	BT_EN_SoC_LS
14	COM8_LS_EN	COM8_LS_EN
17,18	CPSW_RGMII2_MDC	CPSW_RGMII2_MDC
17,18	CPSW_RGMII2_MDIO	CPSW_RGMII2_MDIO
14	BTUART_RTS_SEL	BTUART_RTS_SEL
33	TEST_LED1	TEST_LED1
21	TEST_GPIO2_LS	TEST_GPIO2_LS
39	VSEL_SD_SWITCH	VSEL_SD_SWITCH
39	PMIC_STRB	PMIC_STRB

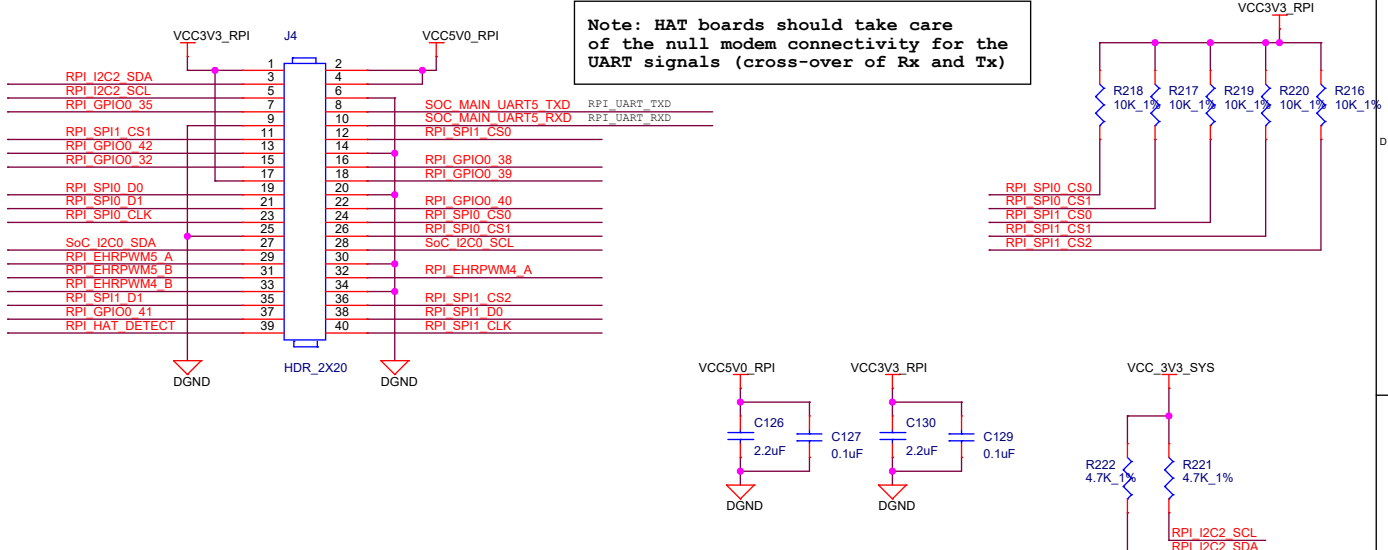


Title				PRU CONNECTOR			
Size	PROC100A 002						Rev
C							A
Date:	Thursday, September 15, 2022			Sheet	25	of	43

GPMC SECTION



USER EXPANSION CONNECTOR

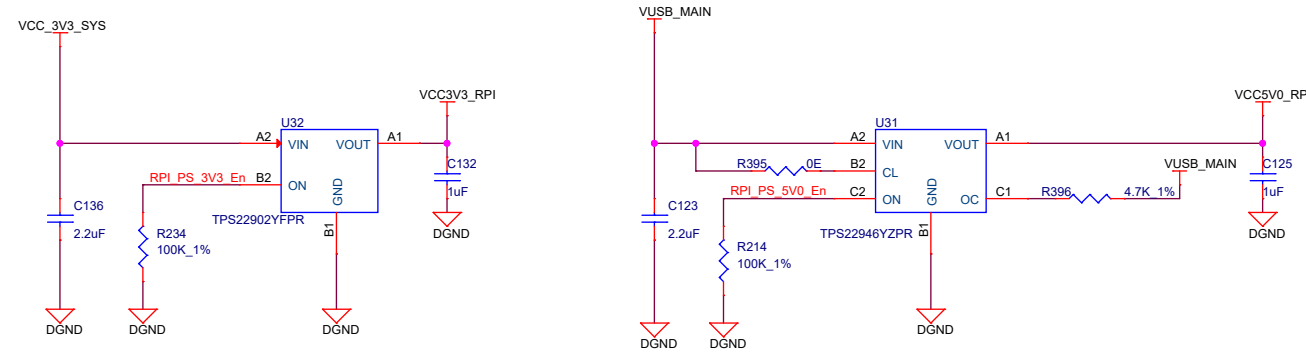


Note: HAT boards should take care of the null modem connectivity for the UART signals (cross-over of Rx and Tx)

Note: This connector is compatible to GPIO Expansion Header (J8) found on the Raspberry Pi Boards

Note: Raspberry Pi is the trademark / wordmark of Raspberry Pi Foundation

POWER SWITCH FOR USER EXPANSION CONNECTOR



NOTE:

AM64x Starter Kit shall not be powered through the 5V0 or 3V3 pins on the 40-pin User Expansion Connector.

User Expansion Connector I/O are not fail-safe and shall not be driven when AM64x Starter Kit is not powered.

5V supply of User Expansion Connector is limited to sourcing 155mA max.

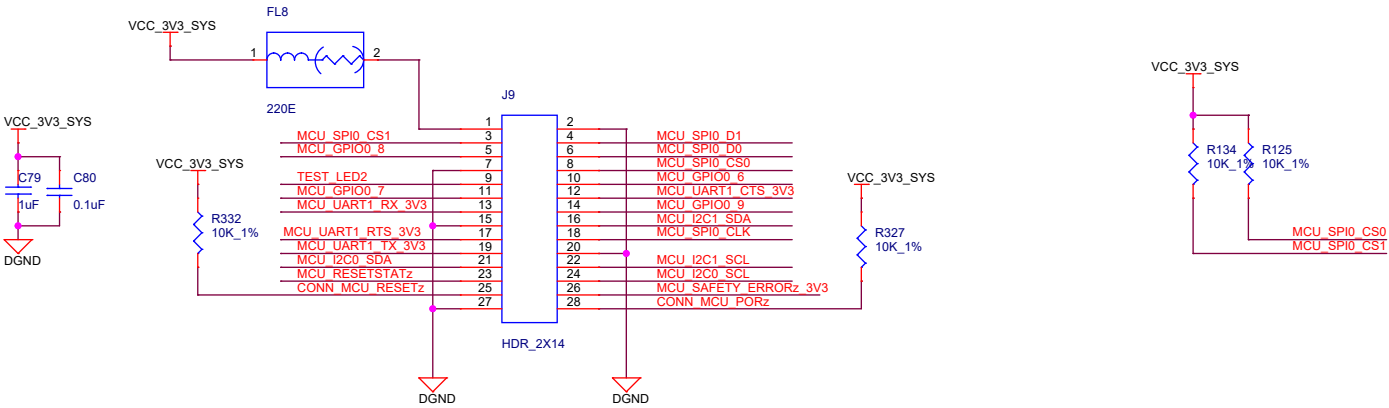
3V3 supply of User Expansion Connector is limited to sourcing 500mA max.

OFF PAGE CONNECTIONS

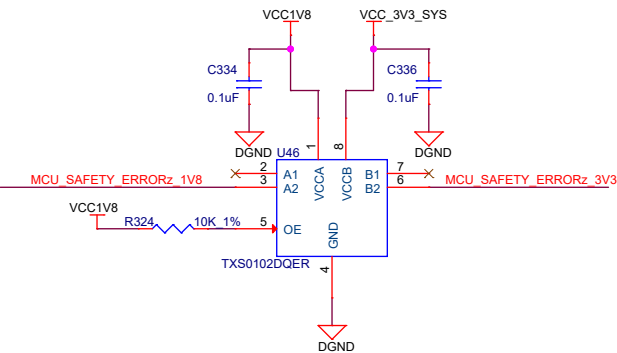
RPI HAT_DETECT	RPI_HAT_DETECT	36
RPI SPI1_CLK	RPI_SPI1_CLK	31
RPI SPI1_D0	RPI_SPI1_D0	31
RPI SPI1_D1	RPI_SPI1_D1	31
RPI SPI1_CS0	RPI_SPI1_CS0	31
RPI SPI1_CS1	RPI_SPI1_CS1	31
RPI SPI1_CS2	RPI_SPI1_CS2	31
RPI SPI0_CLK	RPI_SPI0_CLK	31
RPI SPI0_D0	RPI_SPI0_D0	31
RPI SPI0_D1	RPI_SPI0_D1	31
RPI SPI0_CS0	RPI_SPI0_CS0	31
RPI SPI0_CS1	RPI_SPI0_CS1	31
SoC_I2C0_SCL	SoC_I2C0_SCL	25,31,35,39
SoC_I2C0_SDA	SoC_I2C0_SDA	25,31,35,39
BT_HCI_CTS_LS	BT_HCI_CTS_LS	14
BOOTMODE8	BOOTMODE8	20
BOOTMODE9	BOOTMODE9	20
BOOTMODE11	BOOTMODE11	20
BOOTMODE12	BOOTMODE12	20
BOOTMODE13	BOOTMODE13	20
BOOTMODE14	BOOTMODE14	20
BOOTMODE15	BOOTMODE15	20
SOC_MAIN_UART5_RXD	SOC_MAIN_UART5_RXD	31
SOC_MAIN_UART5_TXD	SOC_MAIN_UART5_TXD	31
RPI PS_3V3_En	RPI_PS_3V3_En	36
RPI PS_5V0_En	RPI_PS_5V0_En	36
BMODE10_GPMC_AD10	BMODE10_GPMC_AD10	14

MCU CONNECTOR

Only 100mA supported on this pin



LEVEL TRANSLATOR



OFF PAGE CONNECTIONS

32	CONN_MCU_RESETz	CONN_MCU_RESETz
32	CONN_MCU_PORz	CONN_MCU_PORz
31	MCU_SPI0_CS1	MCU_SPI0_CS1
31	MCU_GPIO0_8	MCU_GPIO0_8
31,33	TEST_LED2	TEST_LED2
31	MCU_GPIO0_7	MCU_GPIO0_7
31	MCU_UART1_RX_3V3	MCU_UART1_RX_3V3
31	MCU_UART1_RTS_3V3	MCU_UART1_RTS_3V3
31	MCU_UART1_TX_3V3	MCU_UART1_TX_3V3
31	MCU_I2C0_SDA	MCU_I2C0_SDA
31	MCU_I2C0_SCL	MCU_I2C0_SCL
25,31	MCU_RESETSTATz	MCU_RESETSTATz
31	MCU_SPI0_D1	MCU_SPI0_D1
31	MCU_SPI0_D0	MCU_SPI0_D0
31	MCU_SPI0_CS0	MCU_SPI0_CS0
31,32	MCU_GPIO0_6	MCU_GPIO0_6
31	MCU_UART1_CTS_3V3	MCU_UART1_CTS_3V3
31	MCU_GPIO0_9	MCU_GPIO0_9
31	MCU_I2C1_SDA	MCU_I2C1_SDA
31	MCU_I2C1_SCL	MCU_I2C1_SCL
31	MCU_I2C1_CLK	MCU_I2C1_CLK
31	MCU_I2C0_SDA	MCU_I2C0_SDA
31	MCU_I2C0_SCL	MCU_I2C0_SCL
31	MCU_I2C0_CLK	MCU_I2C0_CLK
31	MCU_SAFETY_ERRORz_1V8	MCU_SAFETY_ERRORz_1V8

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Title MCU CONNECTOR

Size PROC100A 002

C

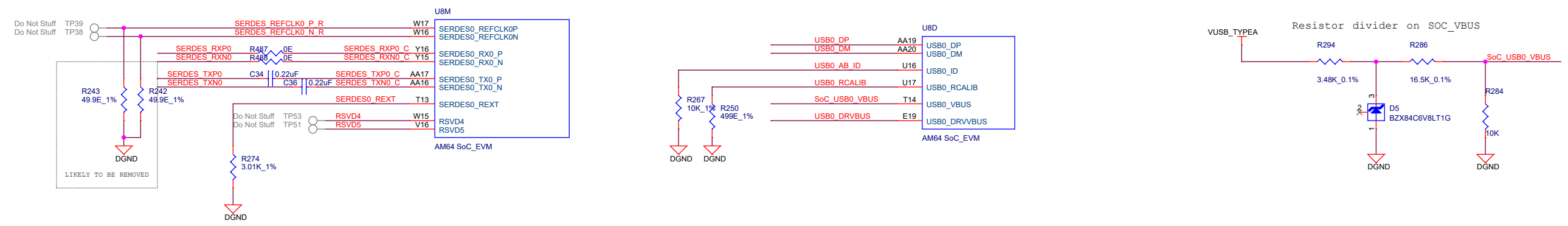
Date: Thursday, September 15, 2022

Sheet 27 of 43

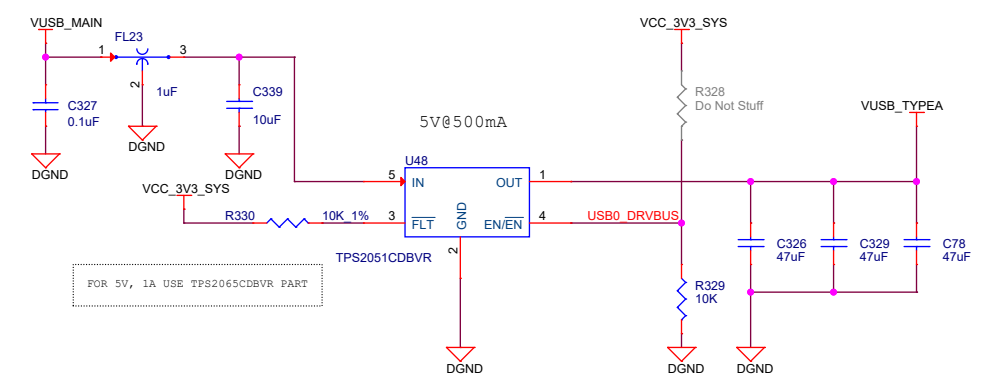
Rev

A

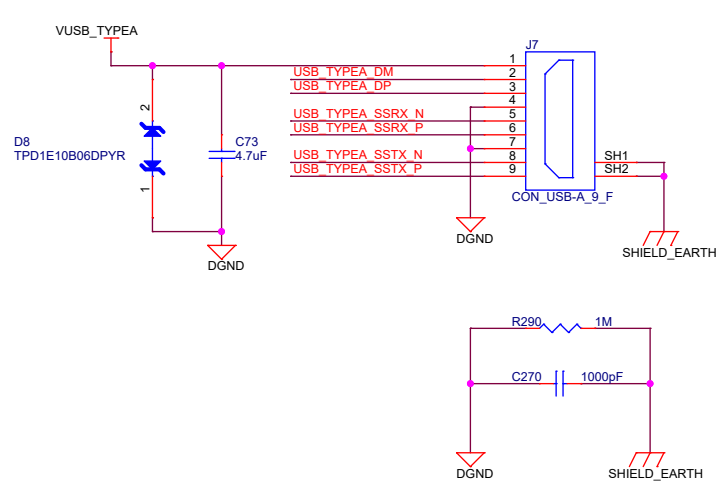
USB 3.0 INTERFACE



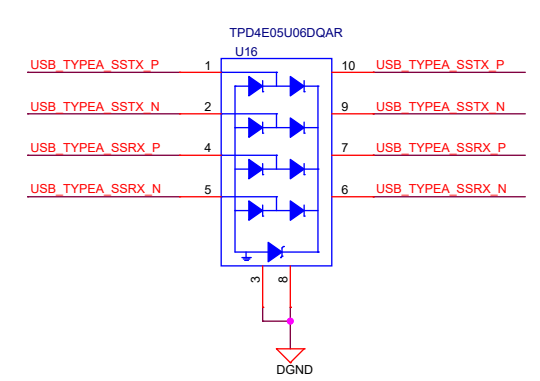
5V Power switch for USB 3.0 Device



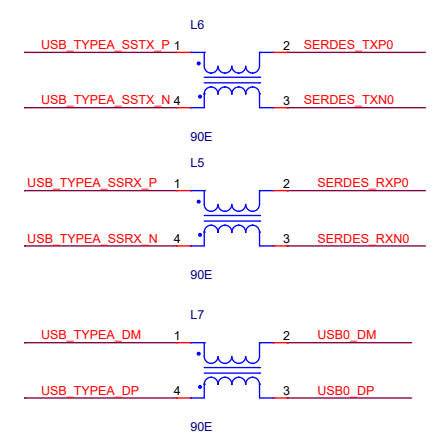
Type-A Connector



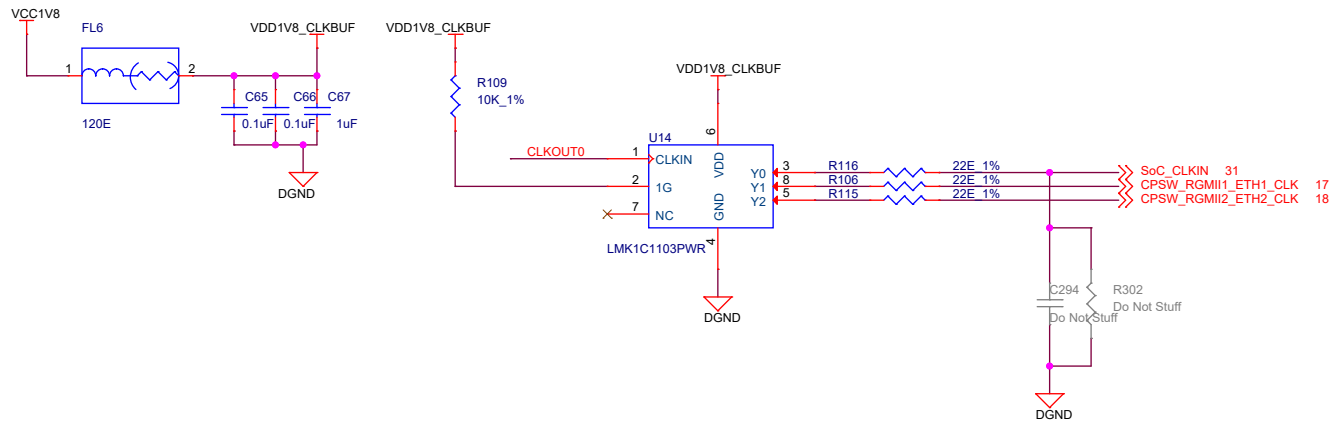
ESD DIODES



CHOKES



ETHERNET PHY CLOCK BUFFER



OFF PAGE CONNECTIONS

31,37 CLKOUT0 << CLKOUT0

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Title ETHERNET PHY CLOCK BUFFER

Size PROC100A 002

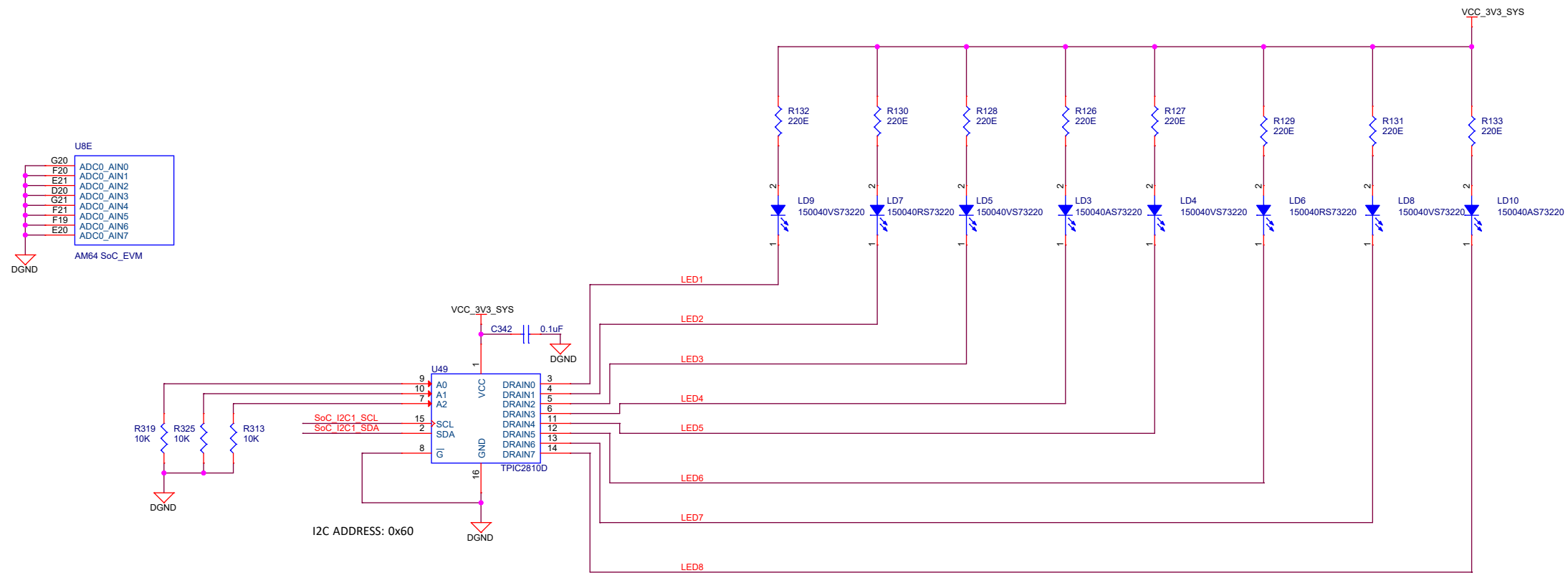
Rev

A

Date: Thursday, September 15, 2022

Sheet 29 of 43

INDUSTRIAL COMMUNICATION LED's



OFF PAGE CONNECTIONS

SoC_I2C1_SCL
SoC_I2C1_SDA

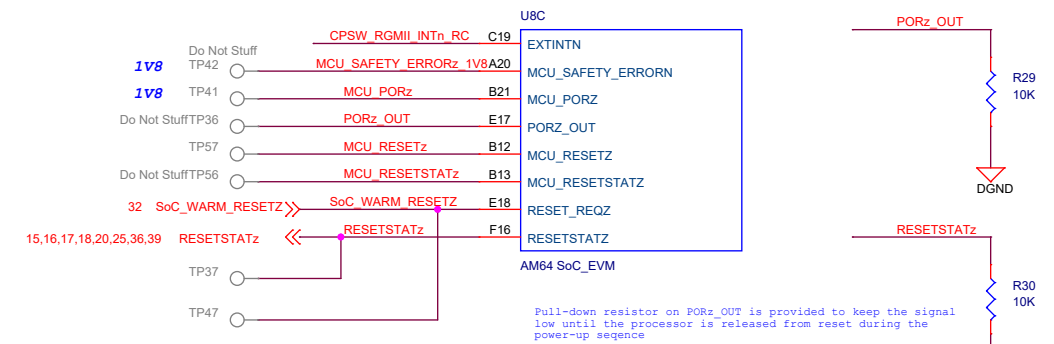
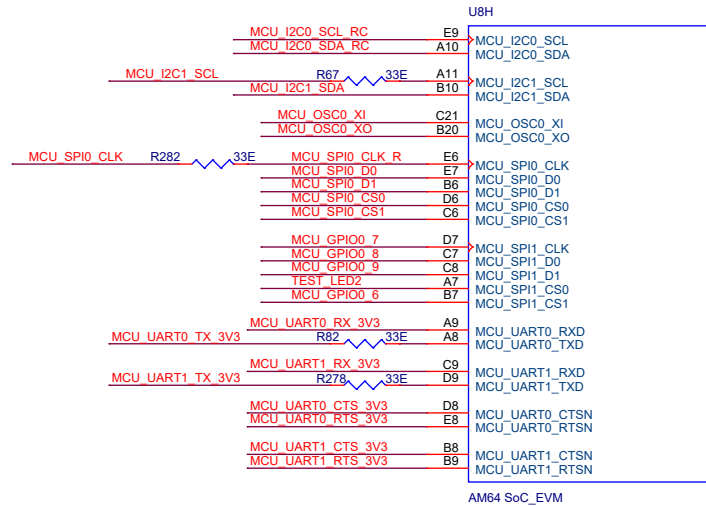
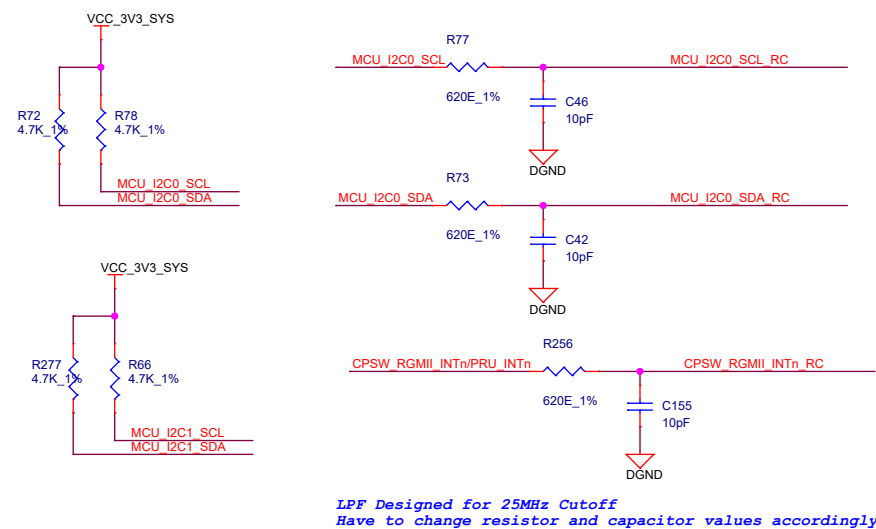
SoC_I2C1_SCL 19,31,34,36
SoC_I2C1_SDA 19,31,34,36

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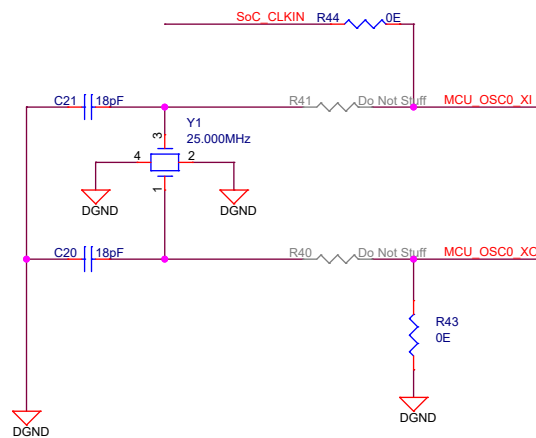
Title INDUSTRIAL COMMUNICATION LED's		
Size	PROC100A 002	Rev
C		A
Date:	Thursday, September 15, 2022	Sheet 30 of 43

MCU_GENERAL

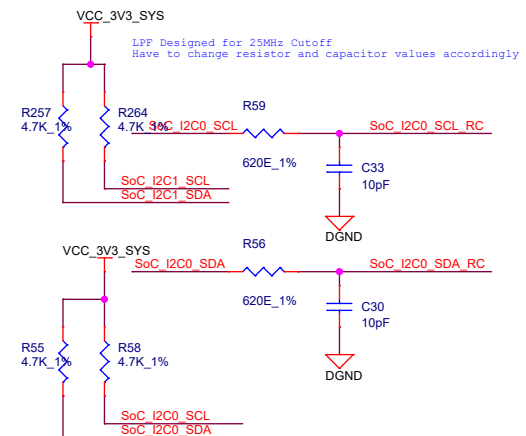
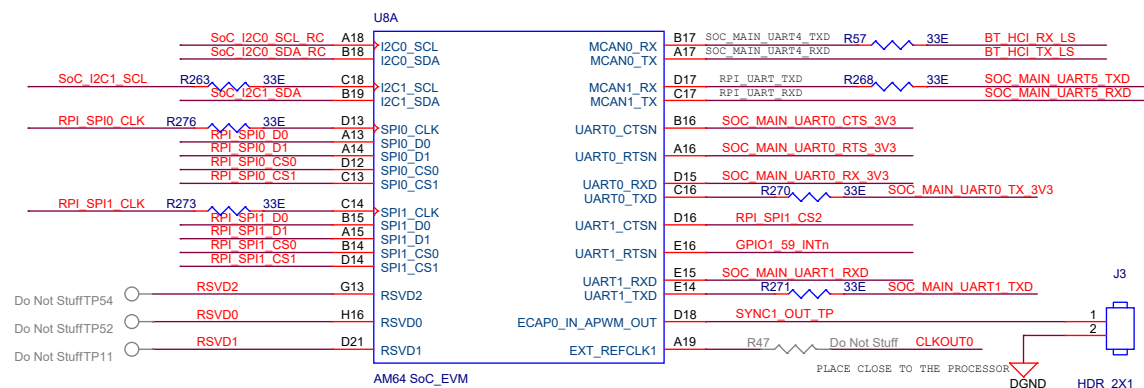


CRYSTAL

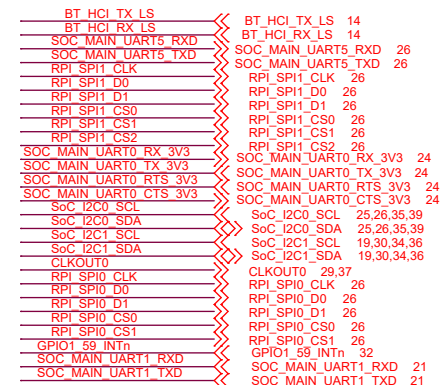
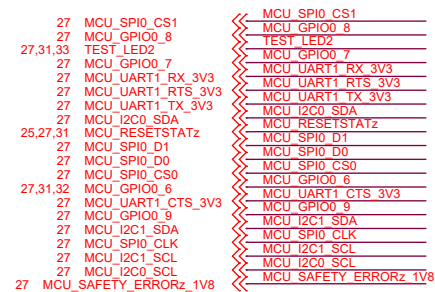
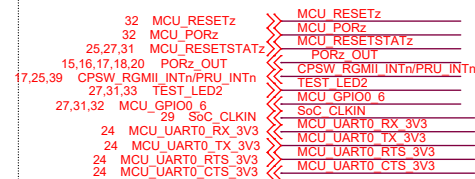
Only Footprint option to mount the Oscillator is provided.
By default the part is not mounted on the board.



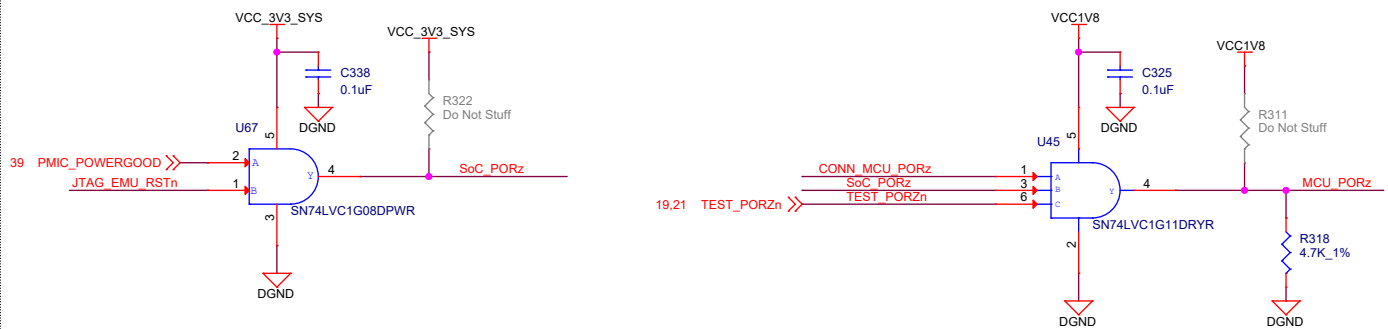
SoC MAIN DOMAIN



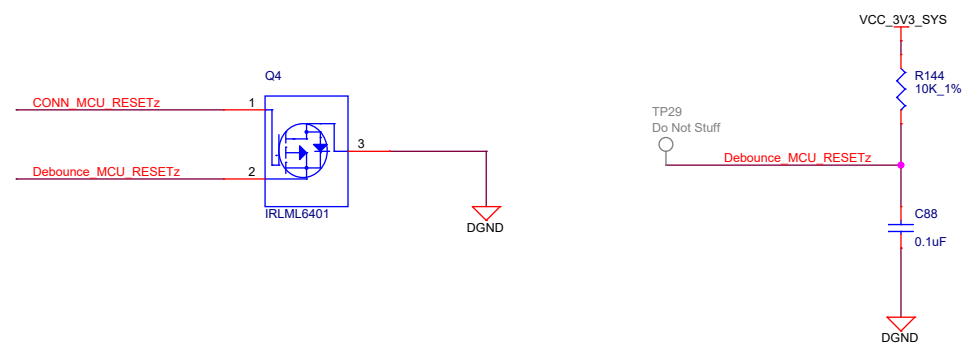
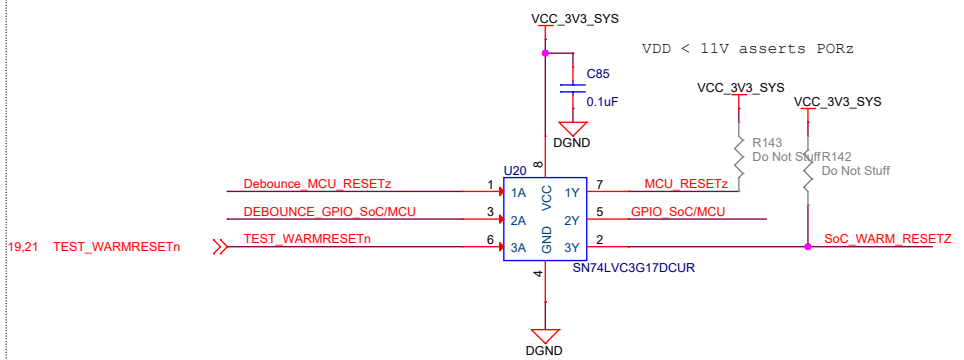
OFF PAGE CONNECTIONS



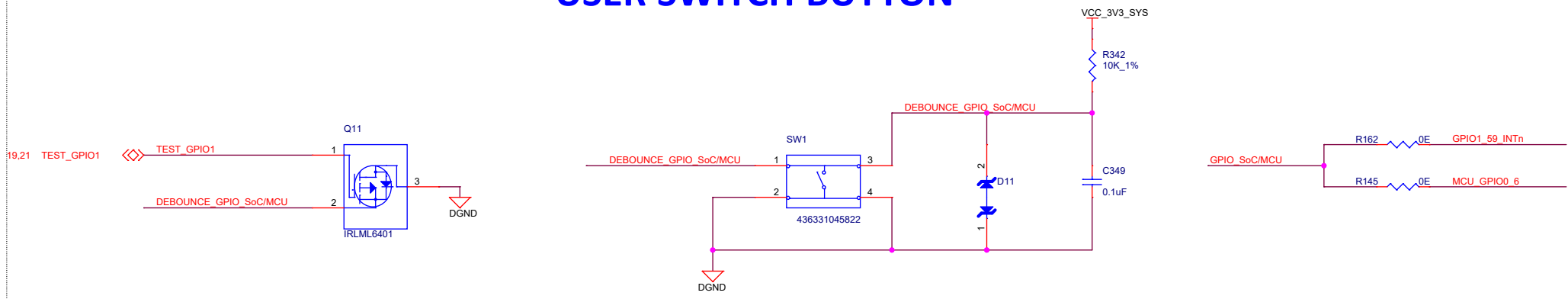
POR



DEBOUNCE CIRCUIT



USER SWITCH BUTTON



OFF PAGE CONNECTIONS

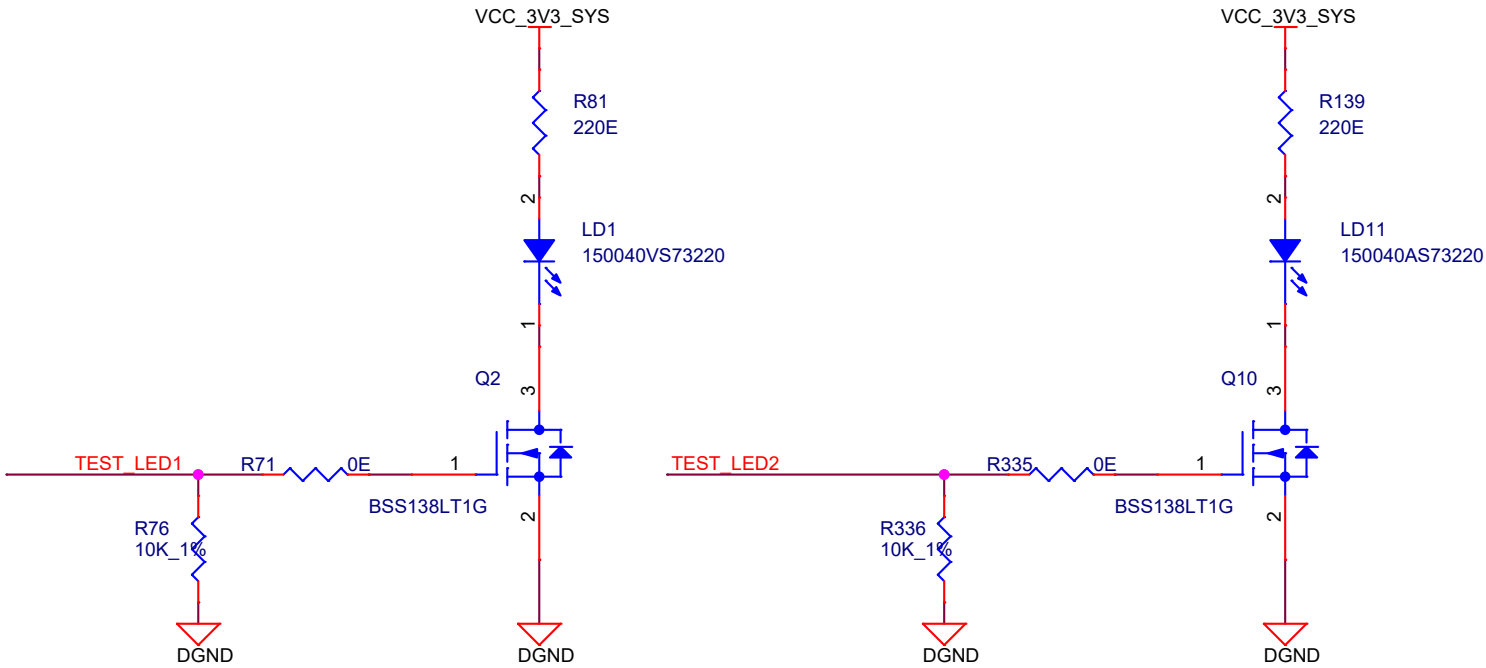
31	SoC WARM RESETz	SoC WARM RESETz
31	MCU RESETz	MCU RESETz
23	JTAG EMU_RSTn	JTAG EMU_RSTn
27	CONN_MCU_RESETz	CONN_MCU_RESETz
31	MCU_PORz	MCU_PORz
27,31	MCU_GPIO0_6	MCU_GPIO0_6
31	GPIO1_59_INTn	GPIO1_59_INTn
27	CONN_MCU_PORz	CONN_MCU_PORz

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Title			RESET CIRCUIT	
Size	PROC100A 002			Rev
C				A
Date:	Thursday, September 15, 2022	Sheet	32 of 43	

USER TEST LED's



OFF PAGE CONNECTIONS

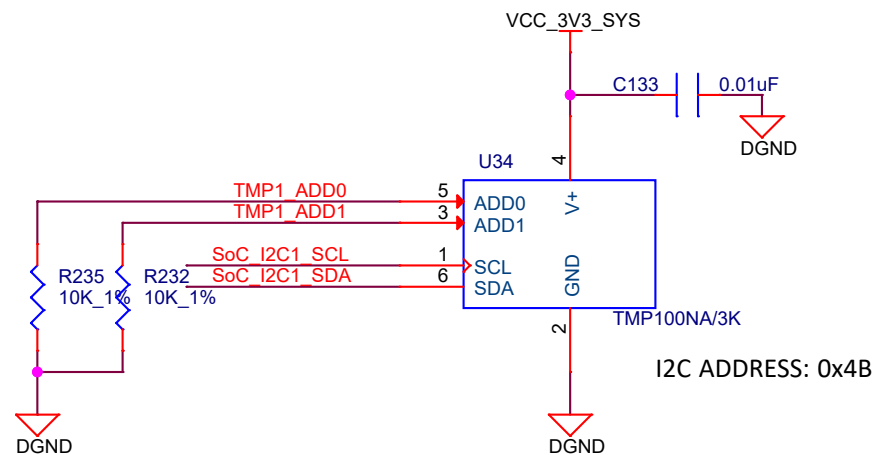


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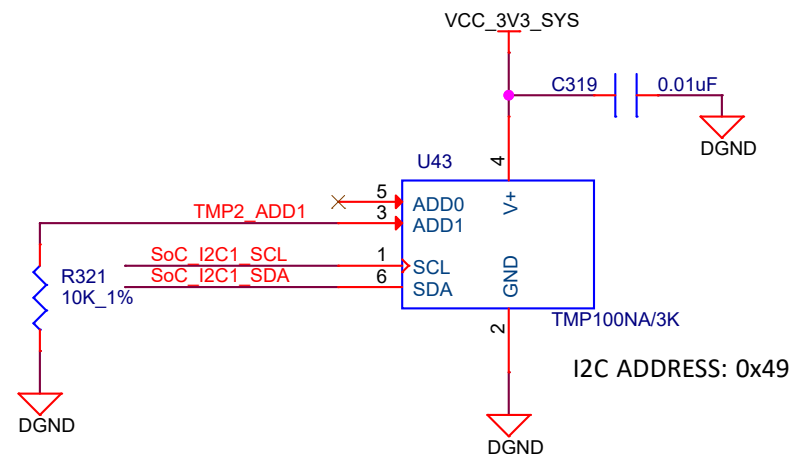


Title			USER TEST LED's		
Size	PROC100A 002				Rev
B					A
Date:	Thursday, September 15, 2022	Sheet	33	of	43

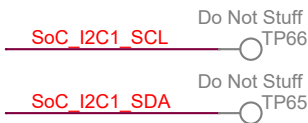
TEMPERATURE SENSORS



NOTE: PLACE TEMP SENSOR CLOSE TO SoC



NOTE: PLACE TEMP SENSOR CLOSE TO LPDDR4



OFF PAGE CONNECTIONS



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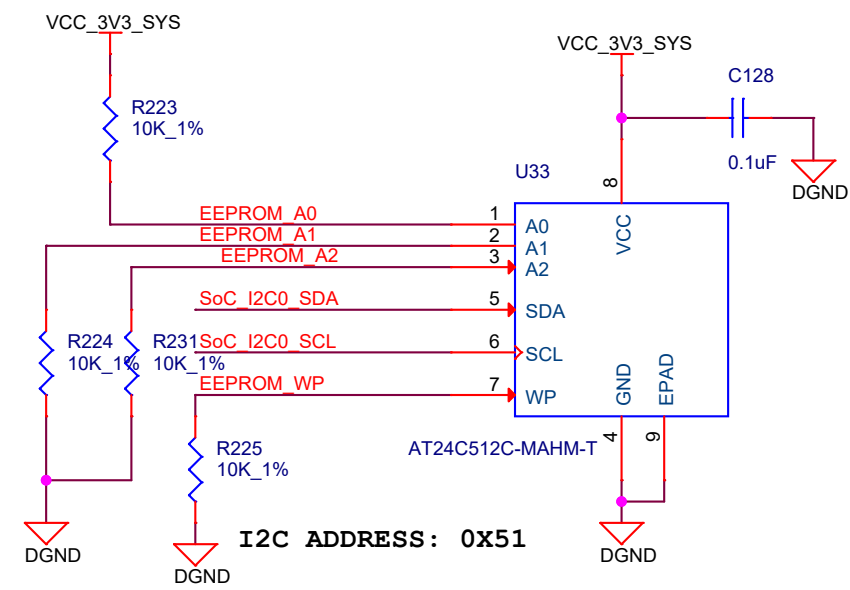
Title TEMPERATURE SENSORS

Size B
PROC100A 002

Rev A

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BOARD ID EEPROM



OFF PAGE CONNECTIONS



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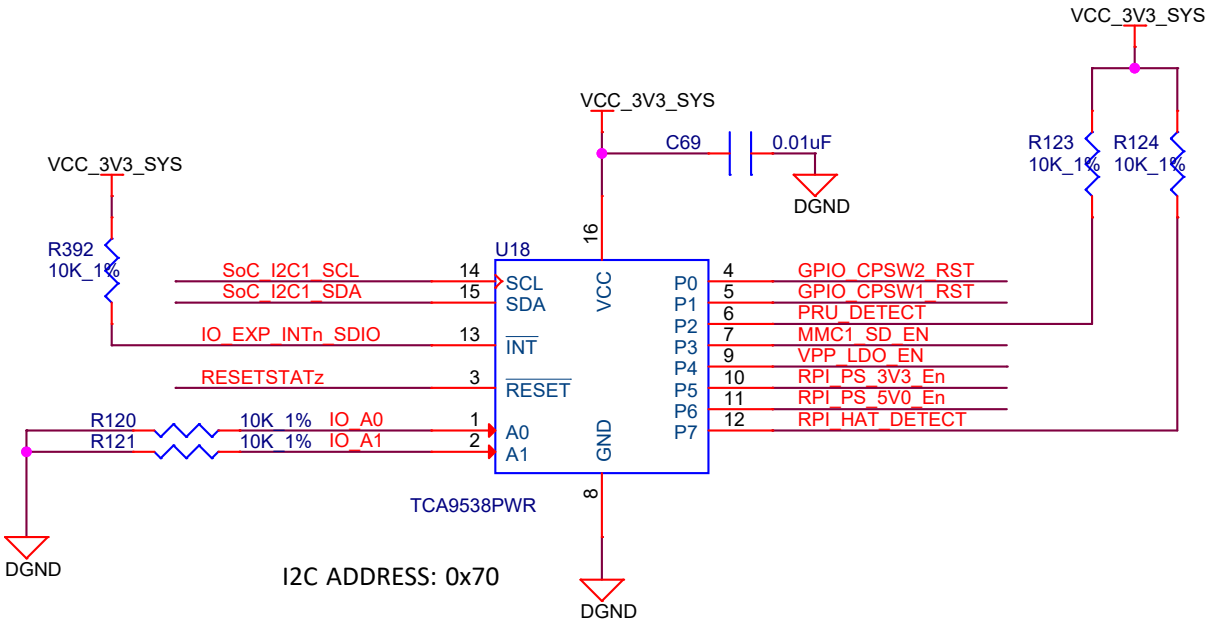
Title BOARD ID EEPROM

Size B
PROC100A 002

Rev A

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IO EXPANDER



OFF PAGE CONNECTIONS

RPI_PS_3V3_En	RPI_PS_3V3_En	26
RPI_PS_5V0_En	RPI_PS_5V0_En	26
GPIO_CPSW2_RST	GPIO_CPSW2_RST	18
GPIO_CPSW1_RST	GPIO_CPSW1_RST	17
MMC1_SD_EN	MMC1_SD_EN	16
VPP_LDO_EN	VPP_LDO_EN	40
RESETSTATz	RESETSTATz	15,16,17,18,20,25,31,39
IO_EXP_INTn_SDIO	IO_EXP_INTn_SDIO	14
SoC_I2C1_SCL	SoC_I2C1_SCL	19,30,31,34
SoC_I2C1_SDA	SoC_I2C1_SDA	19,30,31,34
RPI_HAT_DETECT	RPI_HAT_DETECT	26
PRU_DETECT	PRU_DETECT	25

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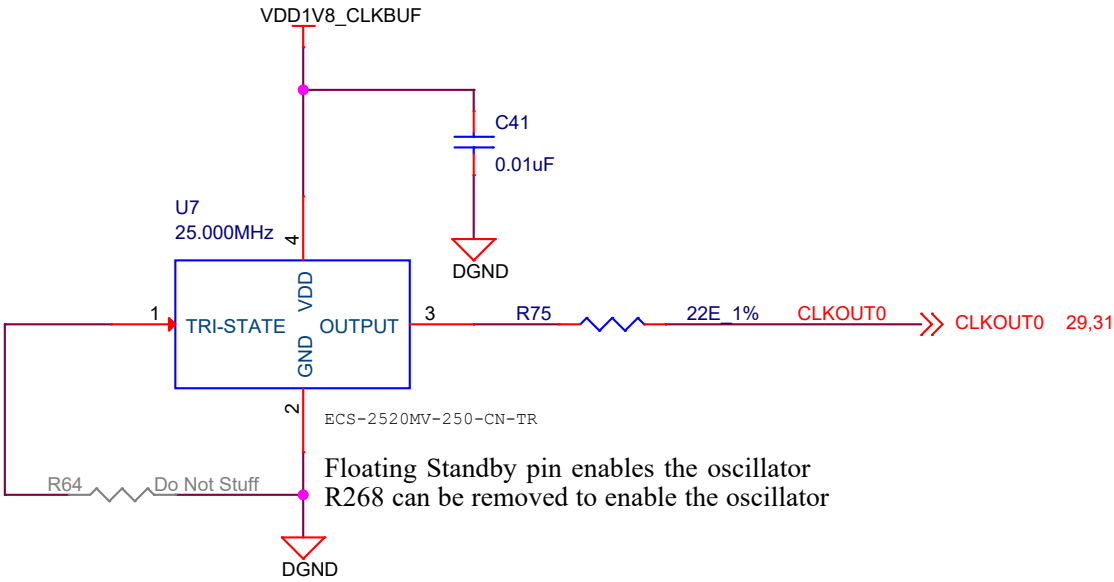
Title IO EXPANDER

Size PROC100A 002

Rev A

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OSCILLATOR



Floating Standby pin enables the oscillator
R268 can be removed to enable the oscillator

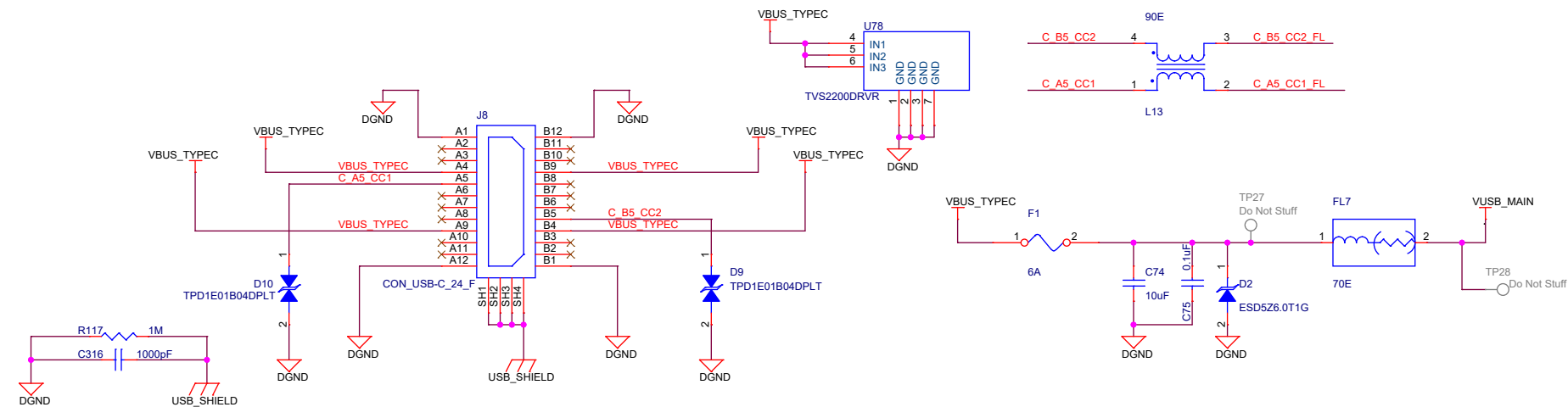
Designed for TI by Mistral Solutions Pvt Ltd



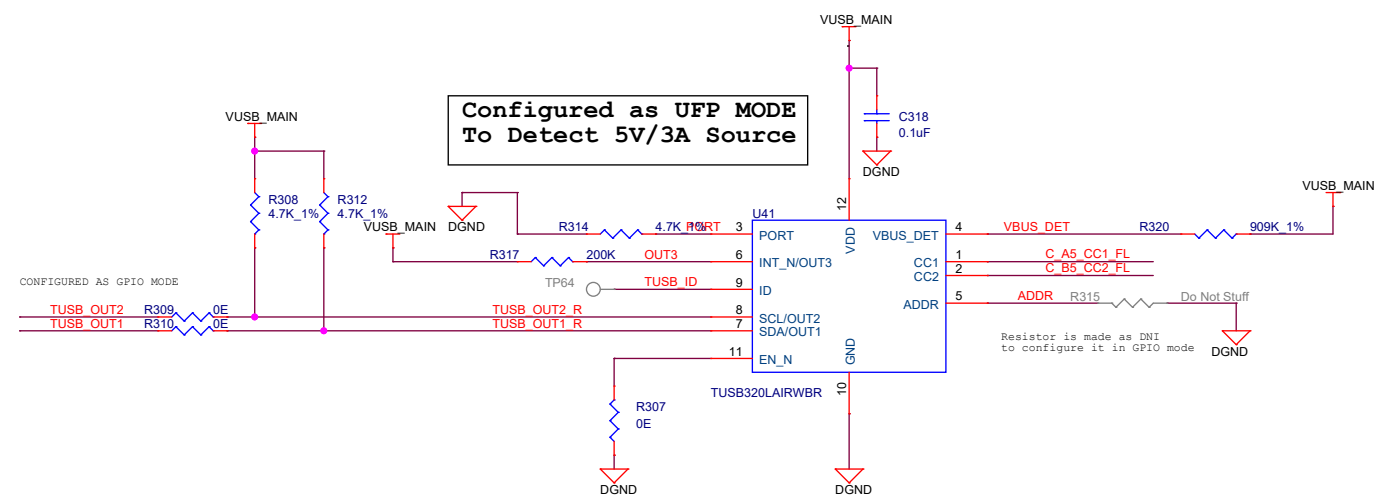
Title OSCILLATOR

Size	Rev	
B	A	
Date:	Thursday, September 15, 2022	Sheet 37 of 43

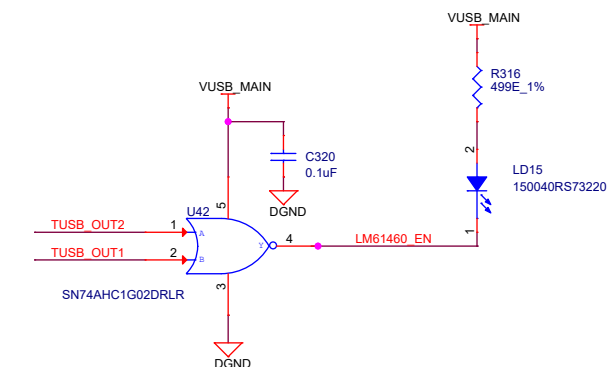
USB TYPE-C CONNECTOR



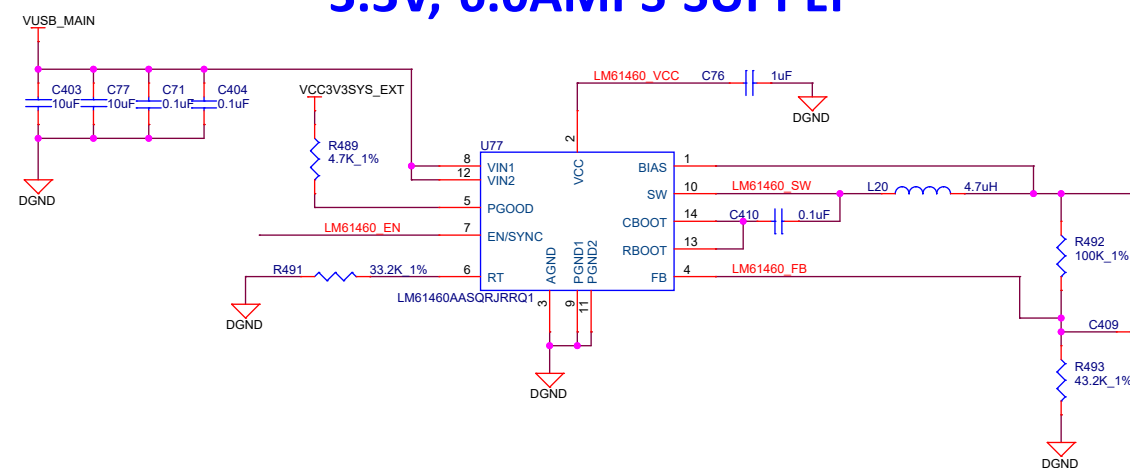
USB TYPE C CONFIGURATION CHANNEL LOGIC AND PORT CONTROLLER



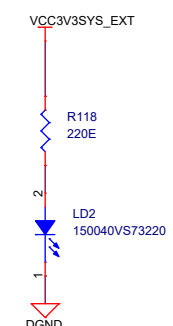
Enable Logic for 3V3 Regulator



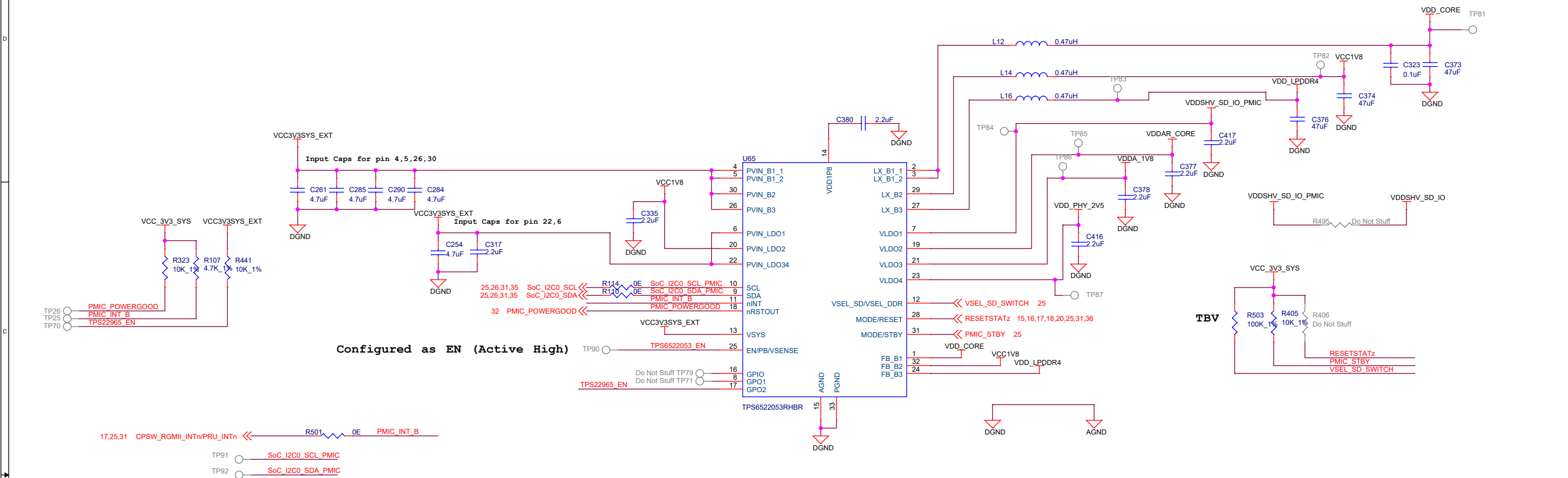
3.3V, 6.0AMPS SUPPLY



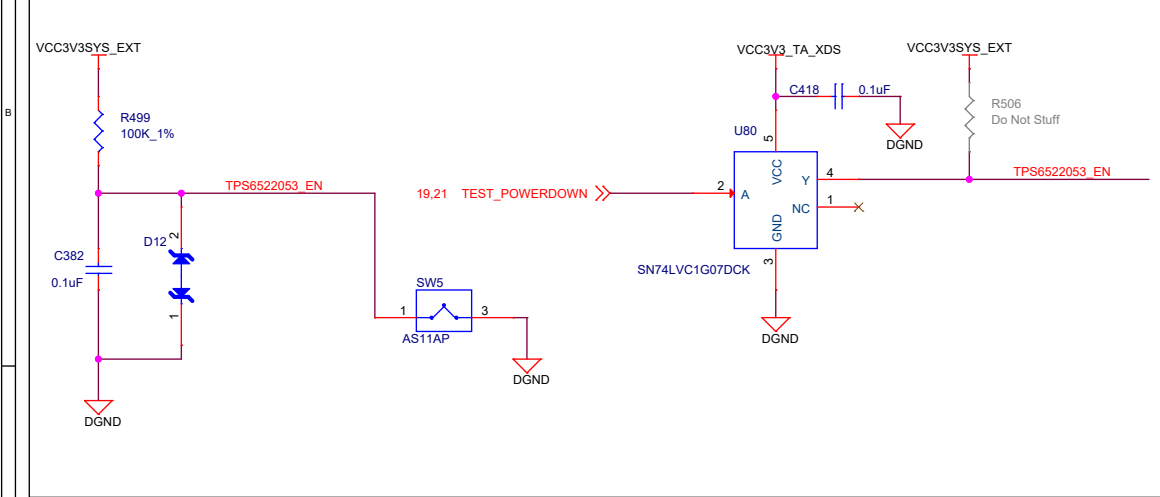
POWER INDICATION LED



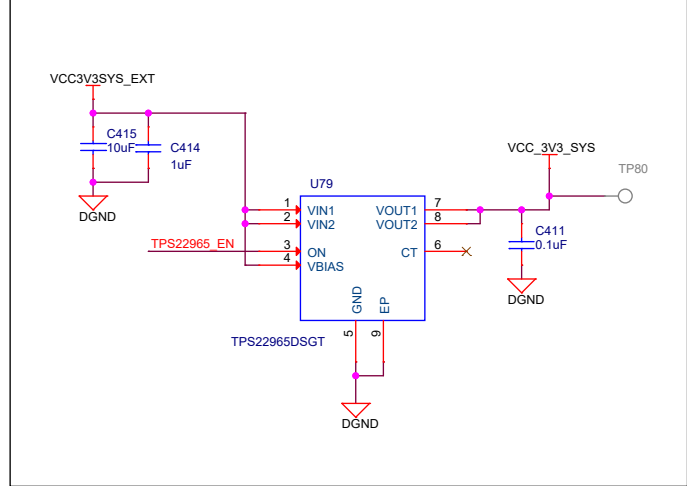
TPS6522053 PMIC



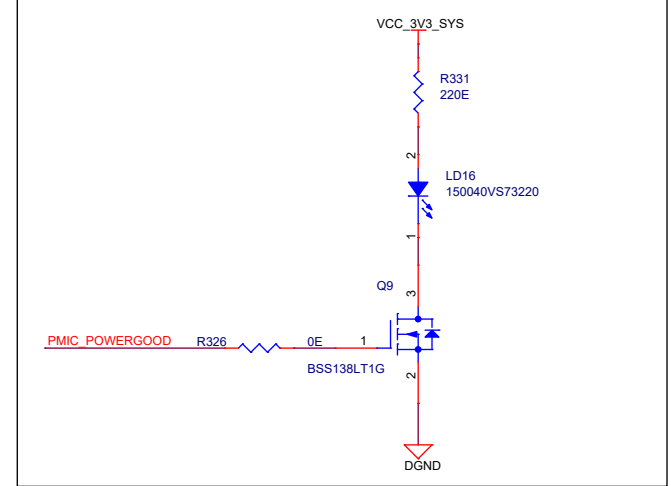
ON/OFF LOGIC



3V3 POWER SWITCH



POWER INDICATION LED



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Title TPS6522053RHBR PMIC

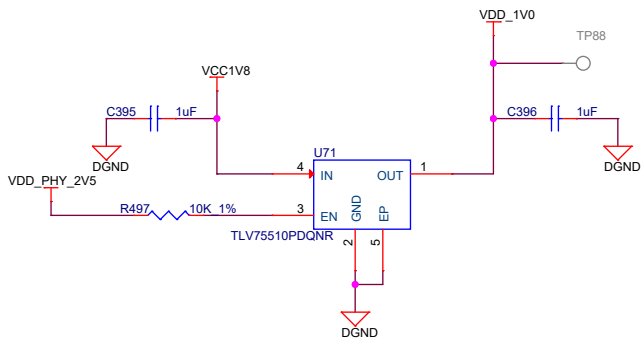
Size PROC100A 002

Date: Thursday, September 15, 2022

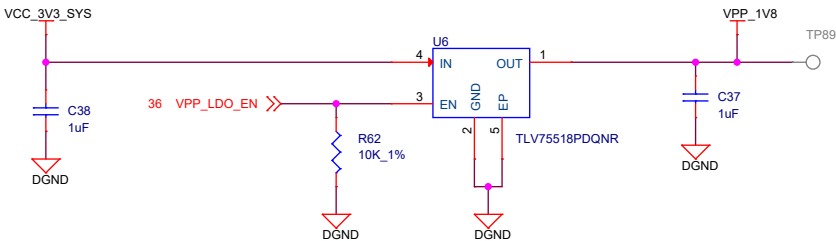
Sheet 39 of 43

Rev A

1.0V, 500mA SUPPLY



eFUSE PROGRAMMING VOLTAGE TO SoC



1.8V VPP, 0.15AMPS SUPPLY

STRAP CONFIGURATION OF ETHERNET PHYS

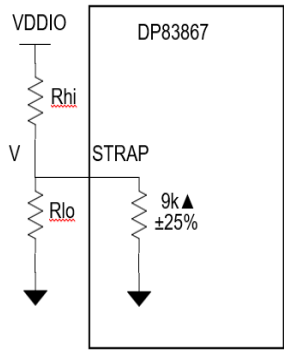


Figure 25. Strap Circuit

MODE	TARGET VOLTAGE			IDEAL R _{hi} (kΩ)	IDEAL R _{lo} (kΩ)
	V _{min} (V)	V _{typ} (V)	V _{max} (V)		
1	0	0	0.098 × VDDIO	OPEN	OPEN
2	0.140 × VDDIO	0.165 × VDDIO	0.191 × VDDIO	10	2.49
3	0.225 × VDDIO	0.255 × VDDIO	0.284 × VDDIO	5.76	2.49
4	0.694 × VDDIO	0.783 × VDDIO	0.888 × VDDIO	2.49	OPEN

Level Strap Resistor Ratios

PIN NAME	64 HTQFP PIN #	48 QFN PIN #	DEFAULT	STRAP FUNCTION		
				MODE	PHY_ADD1	PHY_ADD0
RX_D0	44	33	[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	PHY_ADD3	PHY_ADD2
RX_D2	46	35	[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	ANEG_SEL1	PHY_ADD4
RX_D4	48		[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	Force MDI/X	Half-Duplex Enable (FD/HD)
RX_D5	49		[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	RGMIIDisable	AMDIXDisable
RX_D6	50		[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	Speed Optimization Enable	Clock Out Disable
RX_D7	51		[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE		Autoneg Disable
RX_DV/RX_CTRL ⁽¹⁾ (Straps Required)	53	38	[0]	1		N/A
				2		N/A
				3		0
				4		1
				MODE		Fast Link Drop (FLD)
CRS ⁽²⁾	56		[0]	1		0
				2		1
				3		N/A
				MODE		

Level Strap Pins

PIN NAME	64 HTQFP PIN #	48 QFN PIN #	DEFAULT	STRAP FUNCTION		
				MODE	RGMIIClock Skew TX[1]	RGMIIClock Skew TX[0]
LED_2 ⁽³⁾		45	[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	ANEG_SEL	RGMIIClock Skew TX[2]
LED_1 (RGZ)		46	[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE	ANEG_SEL0	
LED_1 (PAP)	62		[0]	1	0	
				2	0	
				3	1	
				4	1	
				MODE	Mirror Enable	
LED_0 ⁽⁴⁾	63	47	[0]	1	0	
				2	N/A	
				3	1	
				4	N/A	
				MODE	RGMIIClock Skew RX[0]	
GPIO_0 ⁽³⁾		39	[00]	1	0	
				2	Not Applicable	
				3	1	
				4	Not Applicable	
				MODE	RGMIIClock Skew RX[2]	RGMIIClock Skew RX[1]
GPIO_1		40	[00]	1	0	0
				2	0	1
				3	1	0
				4	1	1
				MODE		

Level Strap Pins

MODE	ANEG_SEL	REMARKS
10/100/1000	0	advertise ability of 10/100/1000
100/1000	1	advertise ability of 100/1000 only

MODE	RGMIICLOCK SKEW TX[2]	RGMIICLOCK SKEW TX[1]	RGMIICLOCK SKEW TX[0]	RGMIITX CLOCK SKEW
1	0	0	0	2.0 ns
2	0	0	1	1.5 ns
3	0	1	0	1.0 ns
4	0	1	1	0.5 ns
5	1	0	0	0 ns
6	1	0	1	3.5 ns
7	1	1	0	3.0 ns
8	1	1	1	2.5 ns

MODE	RGMIICLOCK SKEW RX[2]	RGMIICLOCK SKEW RX[1]	RGMIICLOCK SKEW RX[0]	RGMIIRX CLOCK SKEW
1	0	0	0	2.0 ns
2	0	0	1	1.5 ns
3	0	1	0	1.0 ns
4	0	1	1	0.5 ns
5	1	0	0	0 ns
6	1	0	1	3.5 ns
7	1	1	0	3.0 ns
8	1	1	1	2.5 ns

RGMIIClock Skew Details

HARDWARE SCHEMATICS

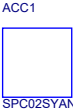
ASSEMBLY NOTES

- 1. All MSL components should be baked as per JEDEC standard.
- 2. PCB should be baked at 120 degree for 8 hours.
- 3. Board assembly must comply with workmanship standards. IPC-A-610 Class 2, unless otherwise specified.
- 4. These assemblies are ESD sensitive, ESD precautions shall be observed.
- 5. These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.
- 6. Provide serial numbers to the assembled boards for identification.
- 7. The assembled board are wrapped in ESD Covers(individual) and packed securely before shipment.

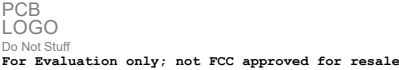
BARE PCB



JUMPERS



LOGOs



FIDUCIALS



LABELS

Board Serial No.



Assembly Revision

