

AM64xx STARTER KIT EVM BOARD

SK-AM64

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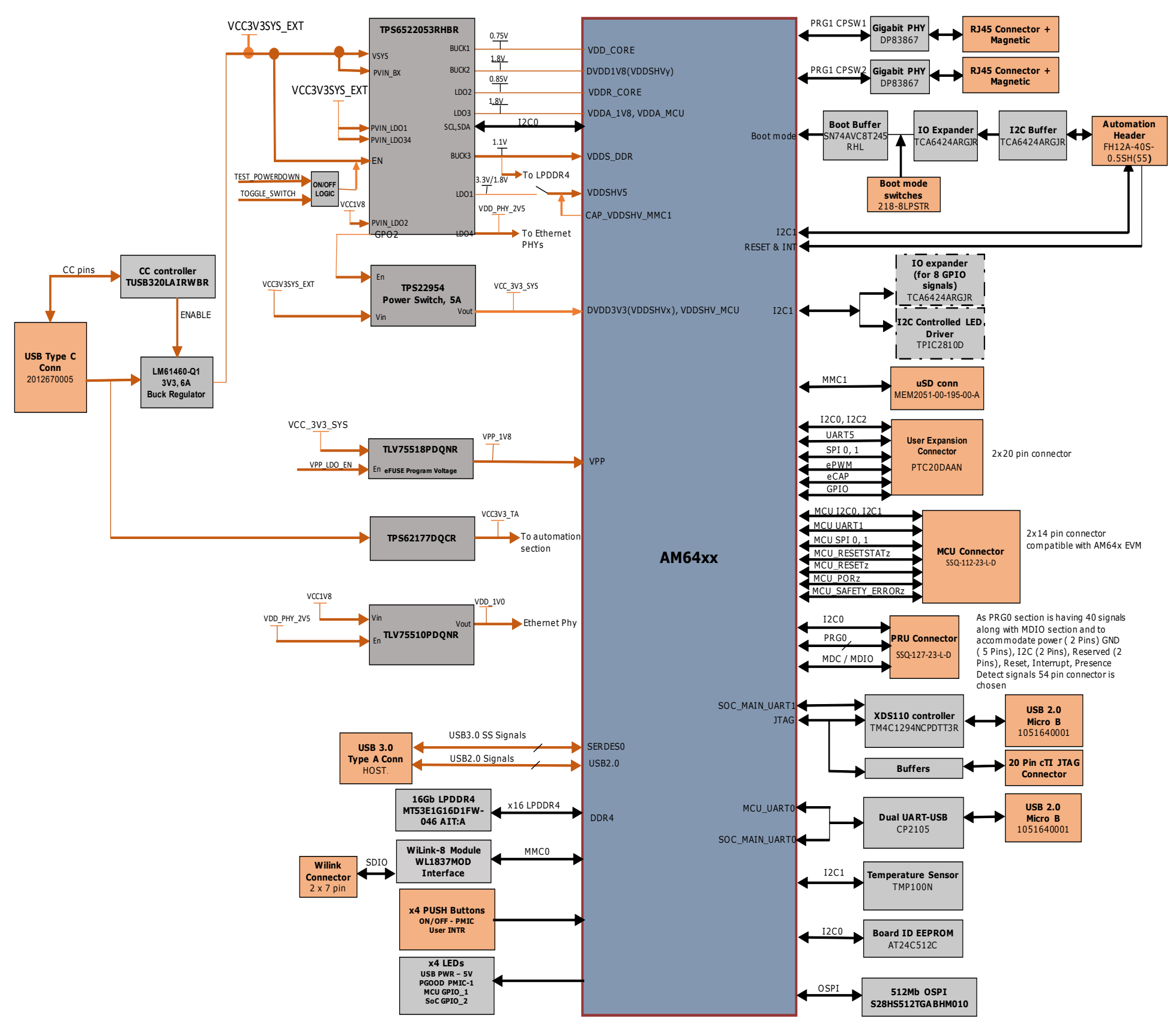
REV	A
VER	1.2

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

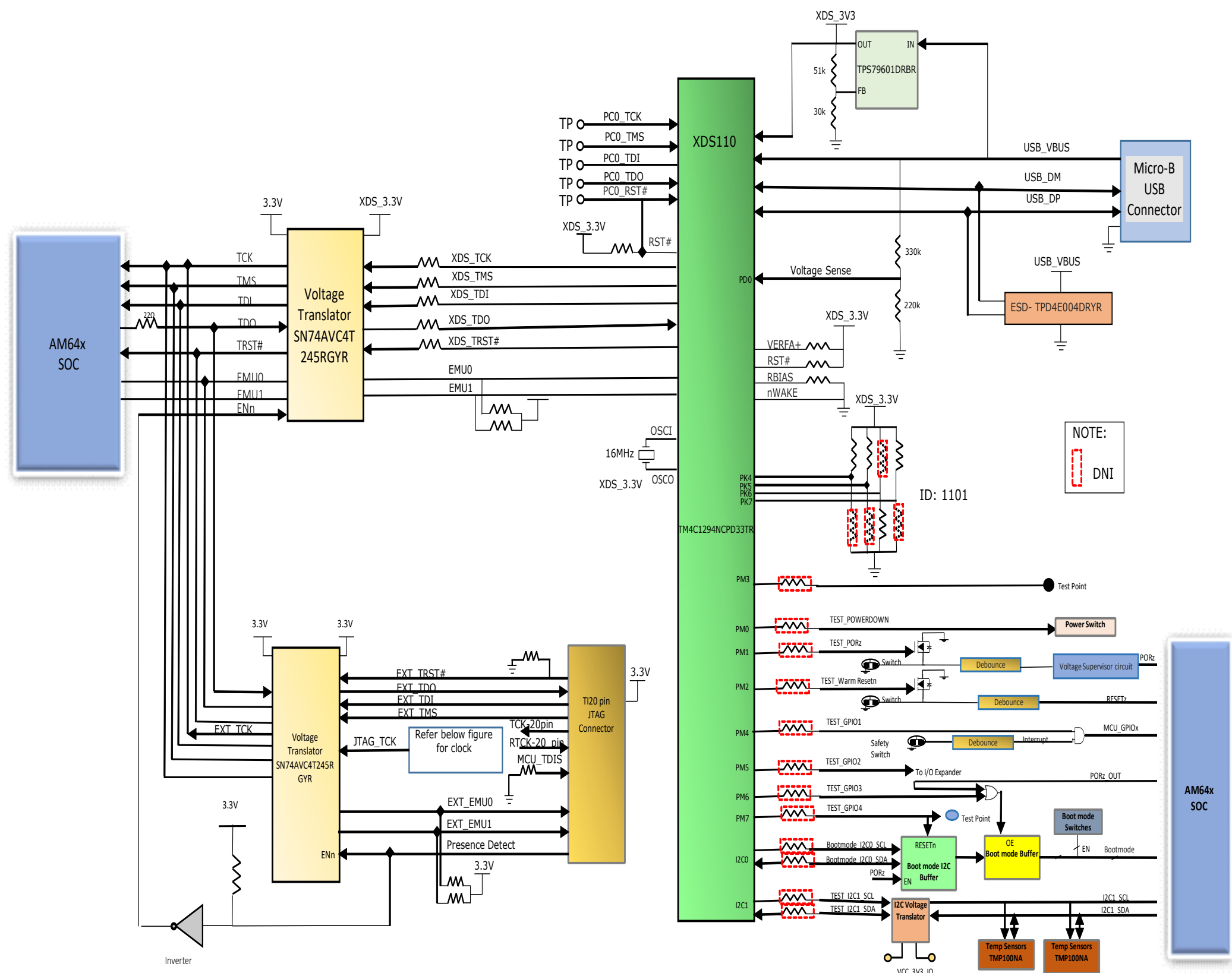
REVISION HISTORY

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		

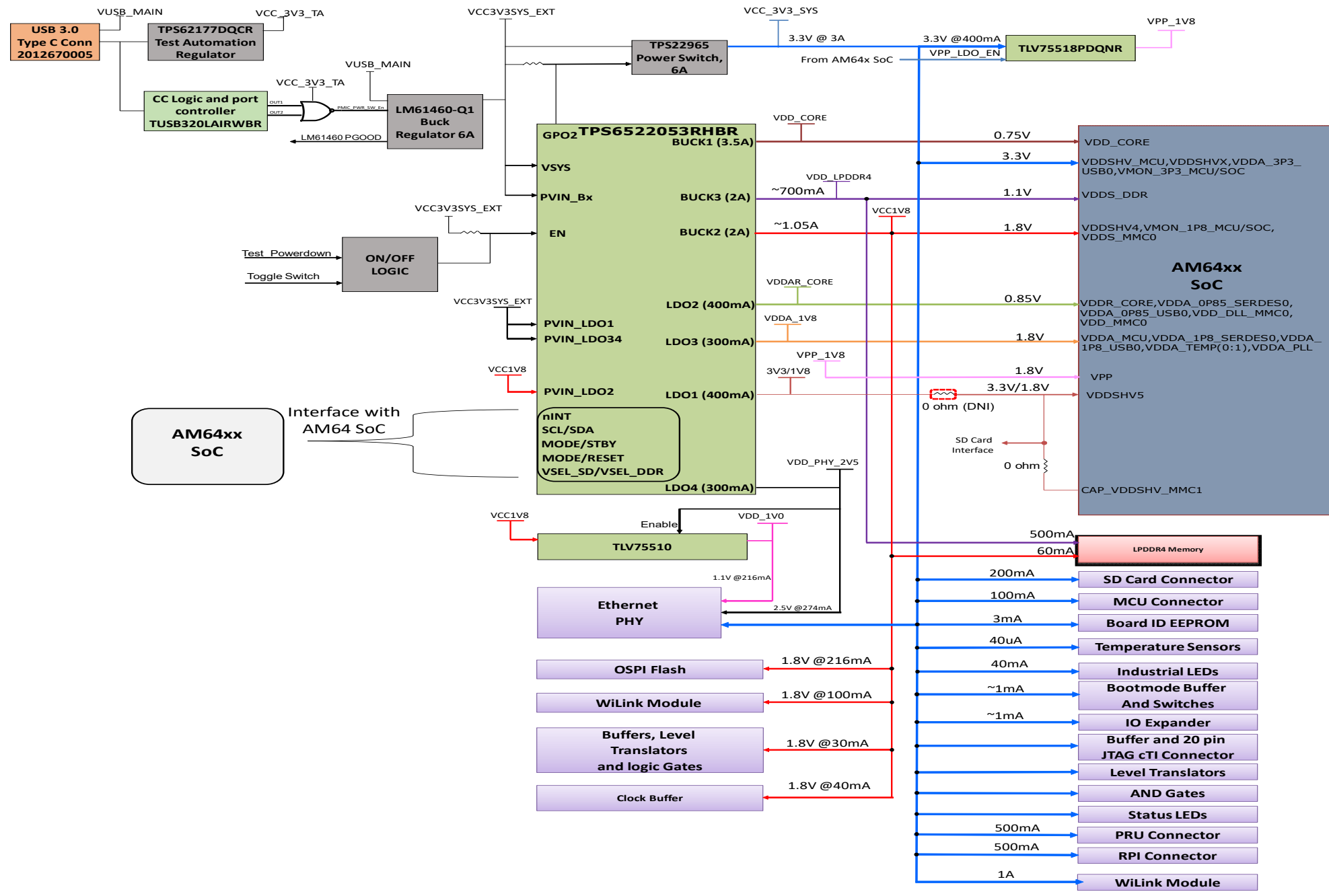
BLOCK DIAGRAM_AM64x_SKEVM



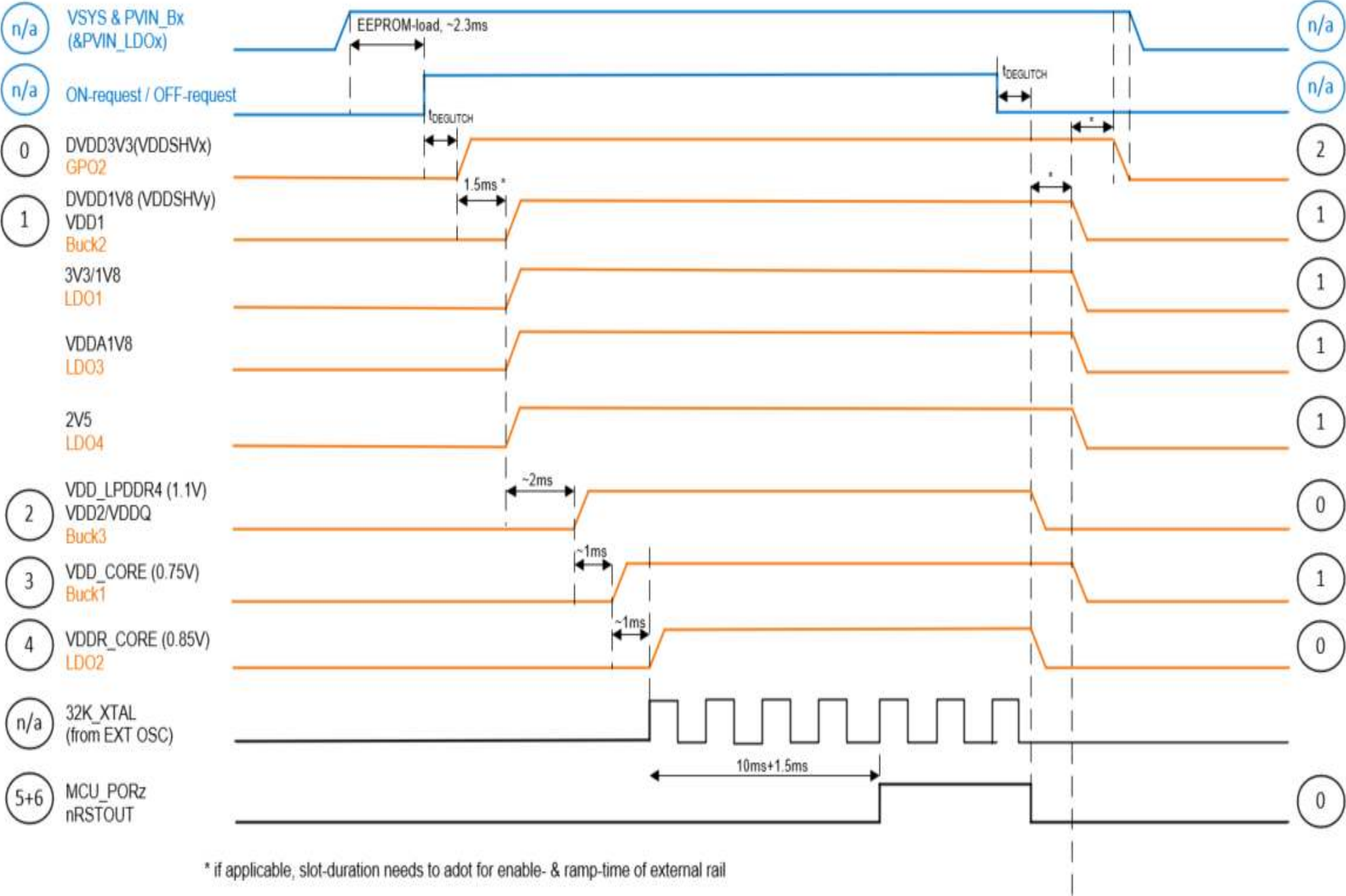
BLOCK DIAGRAM_XDS110



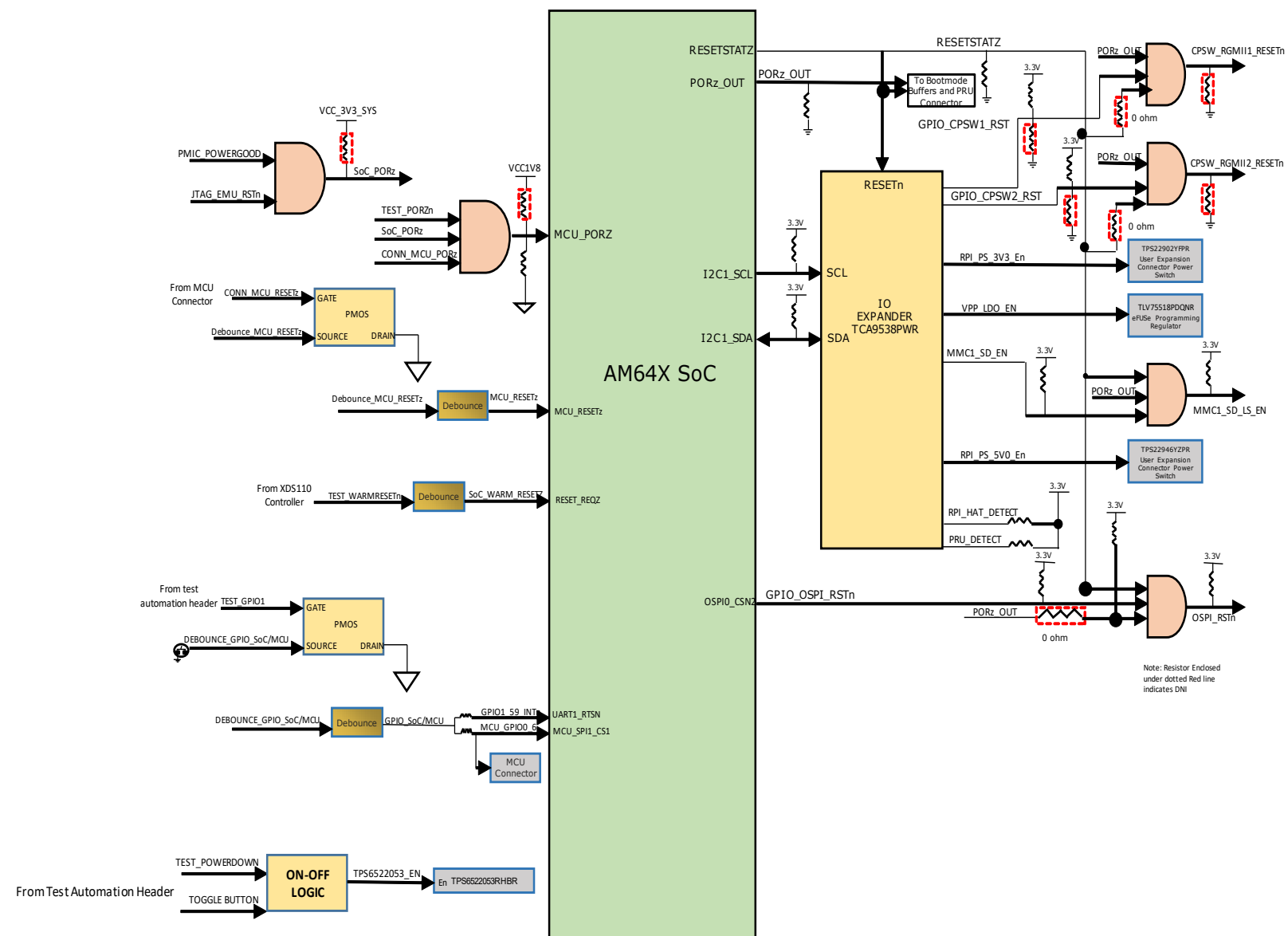
POWER BLOCK DIAGRAM



POWER SEQUENCE



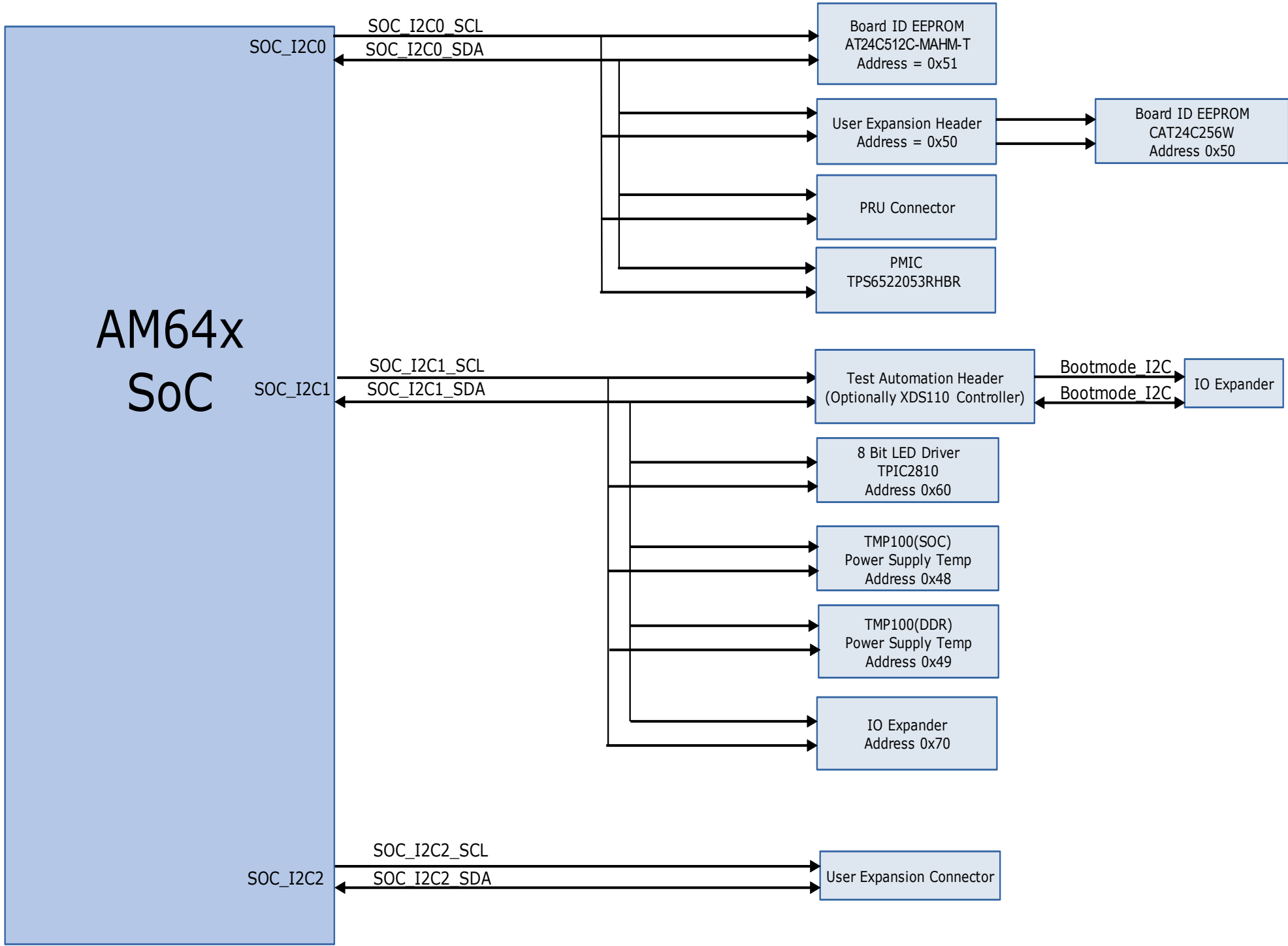
RESET ARCHITECTURE



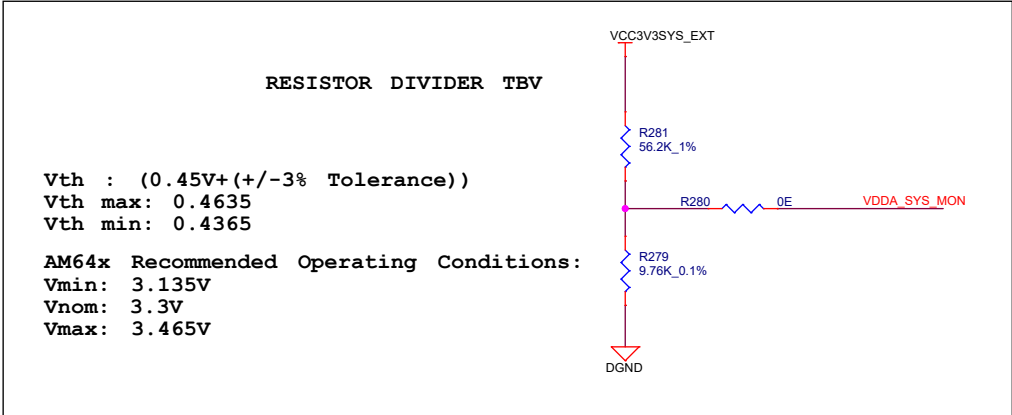
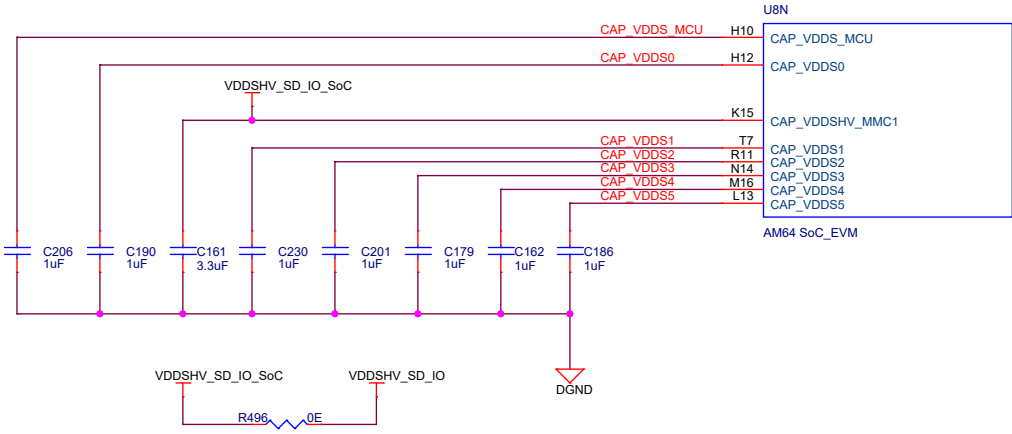
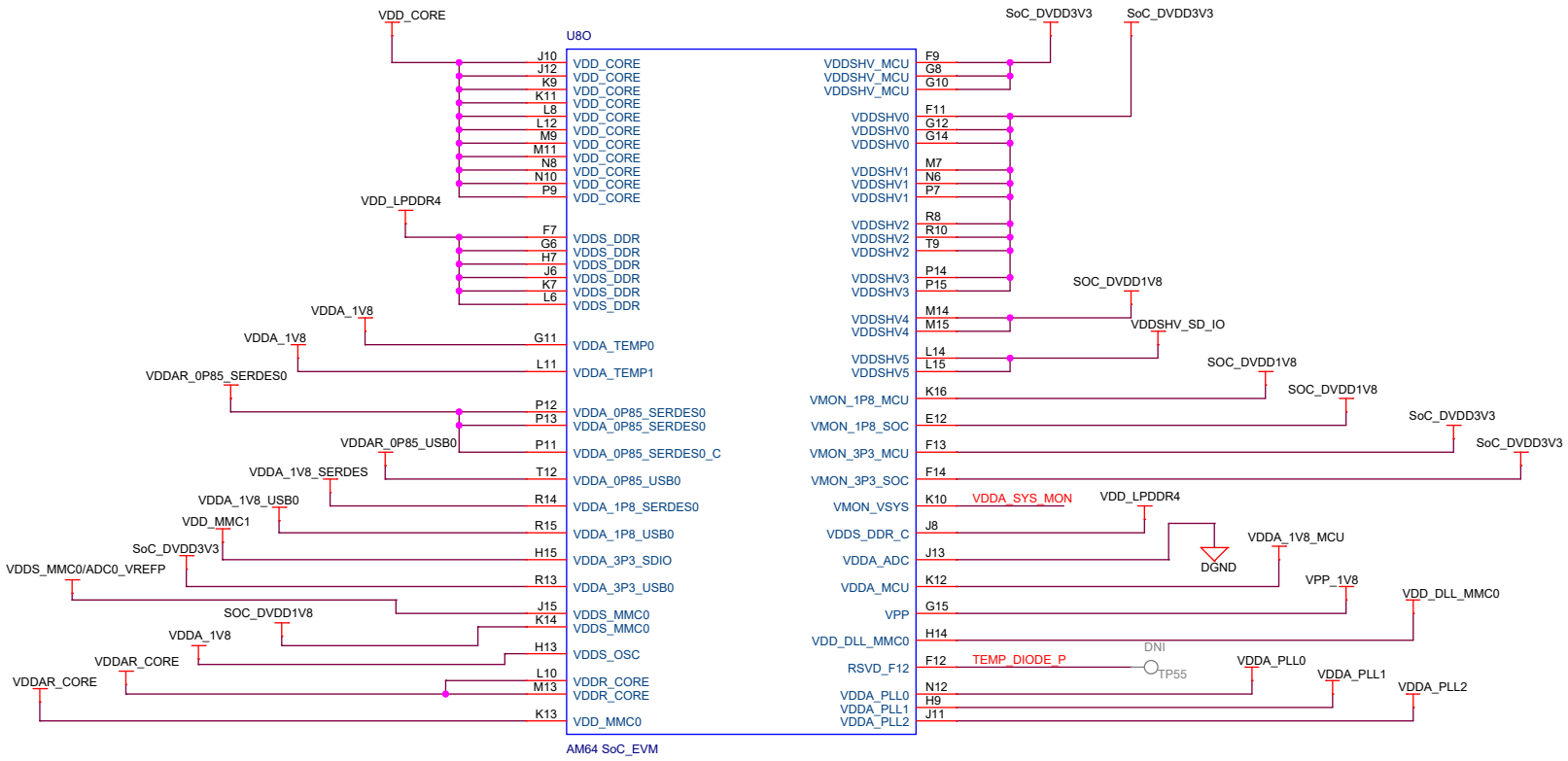
GPIO MAPPING TABLE

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							
12	PRU Connector Interrupt	PRU_INTn		GPIO1_70	EXTINTn	Input	High	Low	VDDSHV0	SoC_DVDD3V3
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

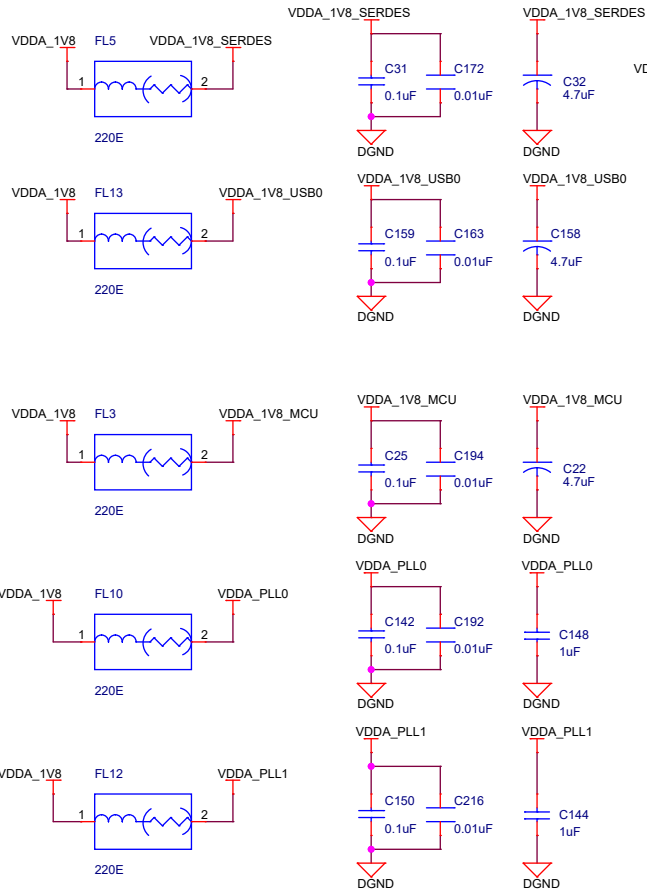
I2C TREE



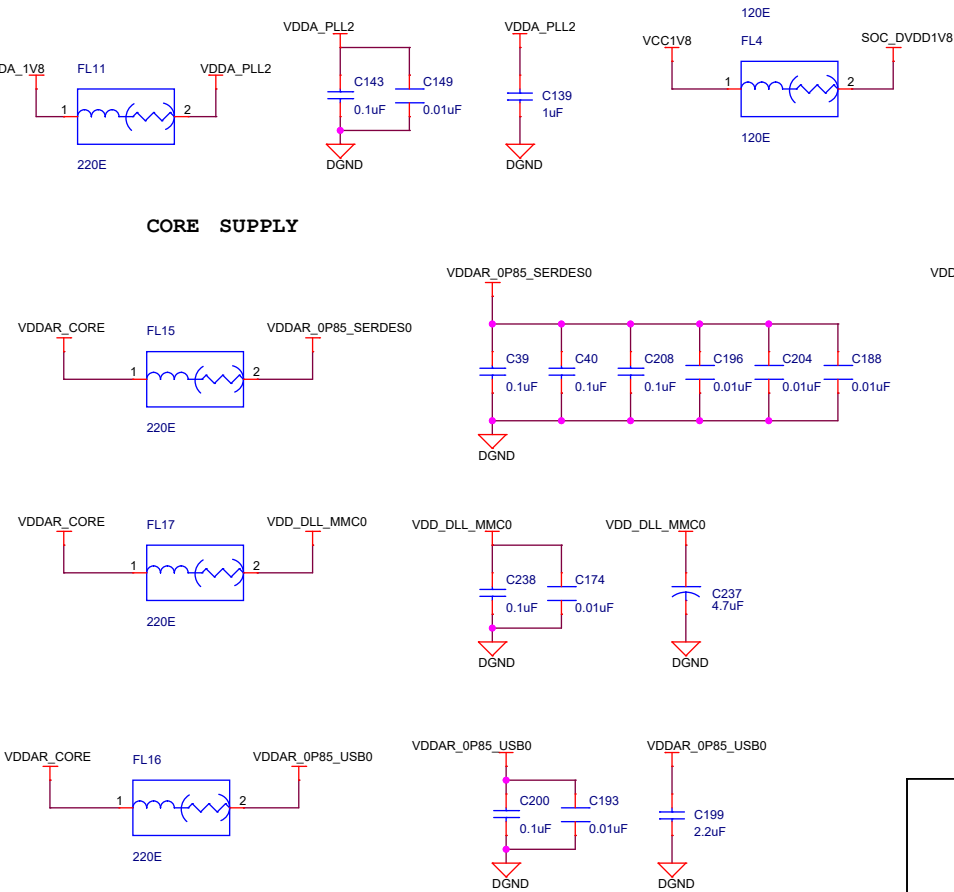
SOC POWER



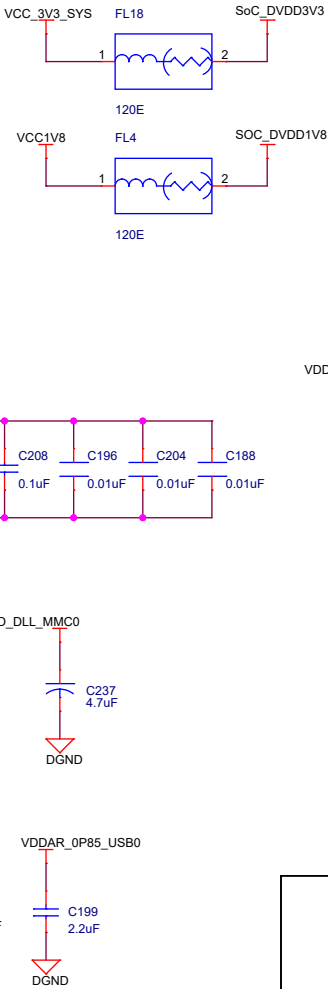
1.8V Analog SUPPLY



1.8V Analog SUPPLY

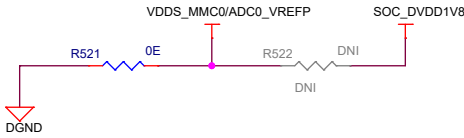


CORE SUPPLY



PG2.0 Changes

If SR1.0 is installed, mount R522 and make R521 as DNI
If SR2.0 is installed, mount R521 and make R522 as DNI



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Title SOC POWER

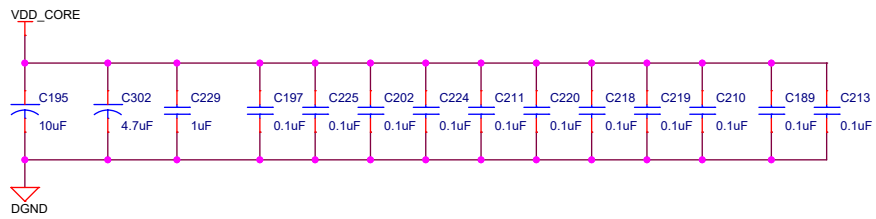
Size PROC100 001 SKAM64

Rev A

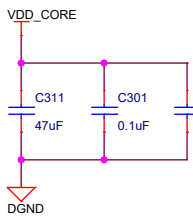
Date: Monday, August 22, 2022

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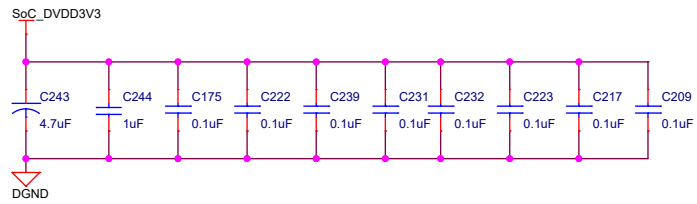
SOC POWER DECAPS



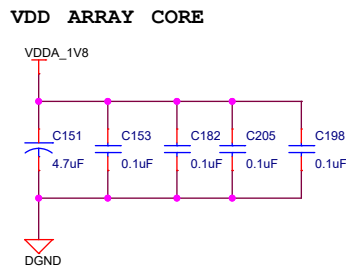
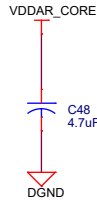
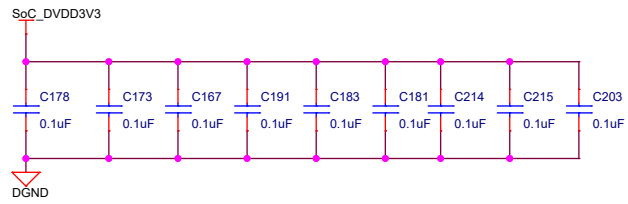
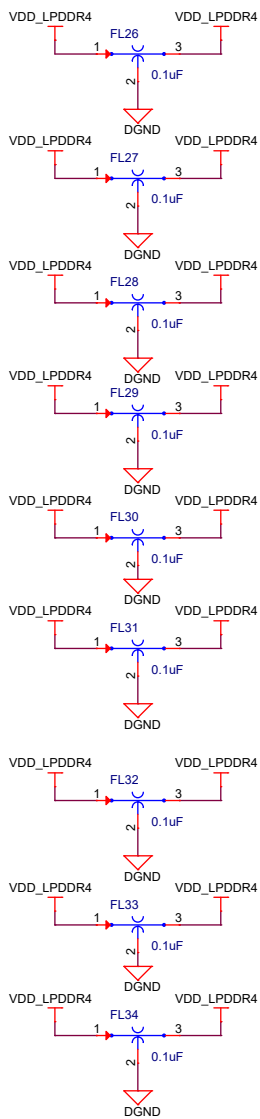
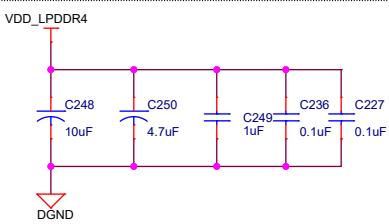
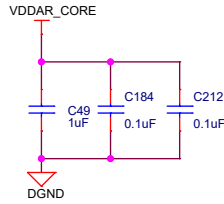
Place one 0.1uF cap near each Pin



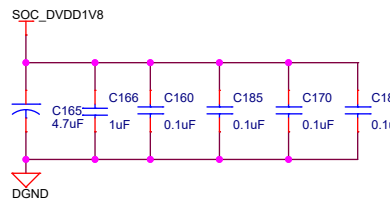
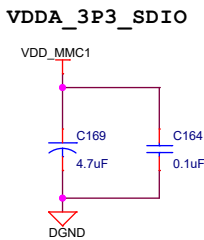
To place after current sense resitor on VDD_CORE plane



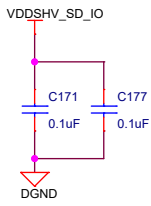
Place one 0.1uF cap near each Pin



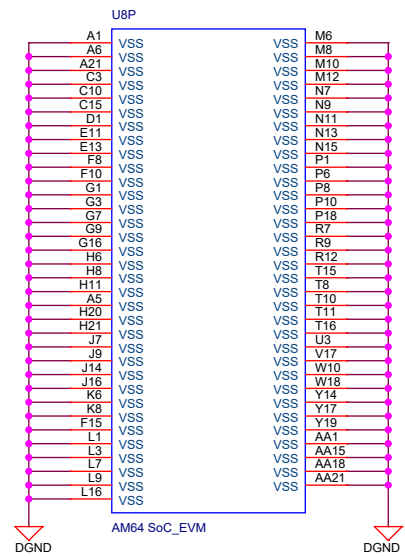
Place one 0.1uF cap near each Pin



Place one 0.1uF cap near each Pin



SOC POWER - VSS

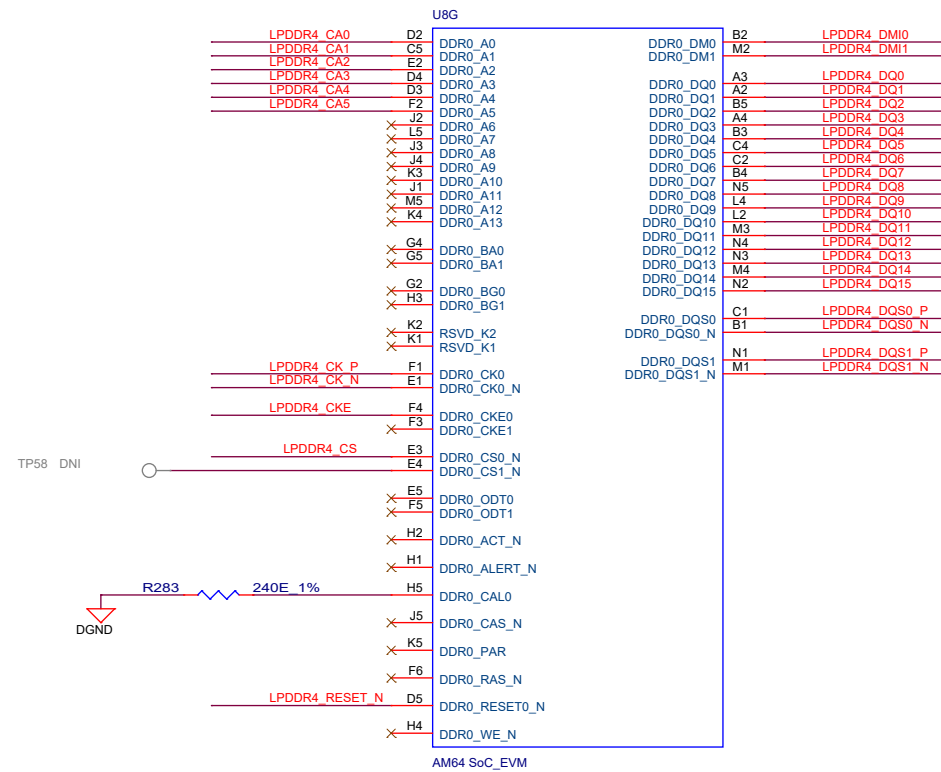


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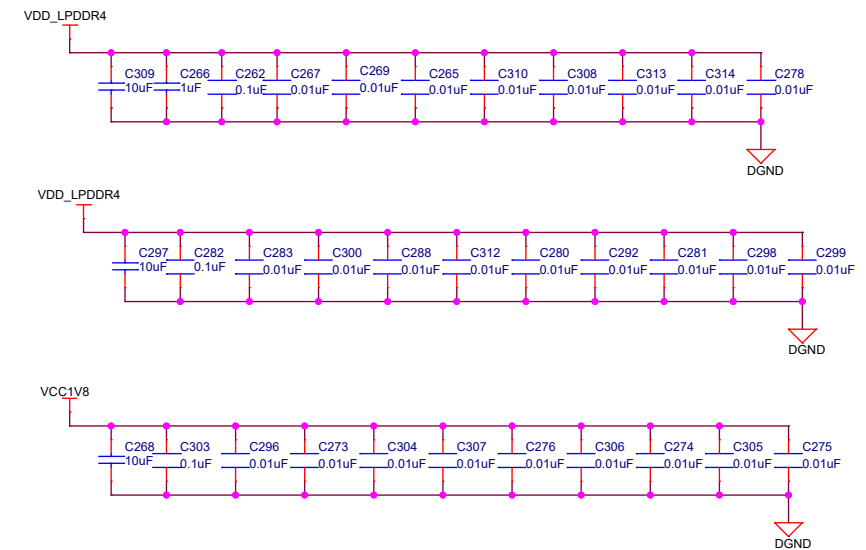


Title SOC VSS		
Size	PROC100 001 SKAM64	Rev
C		A
Date:	Monday, August 22, 2022	Sheet 12 of 43

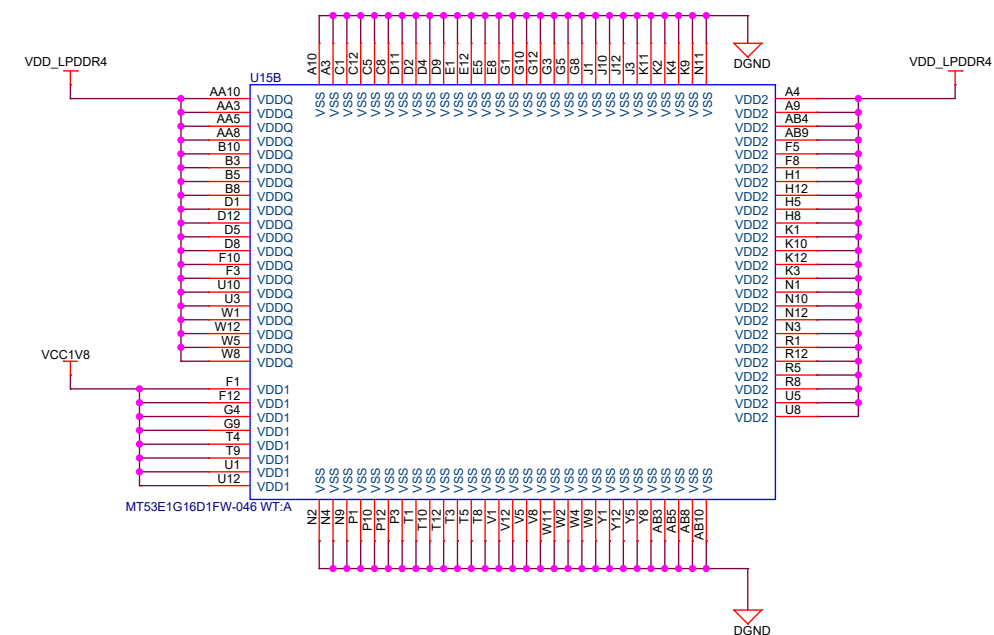
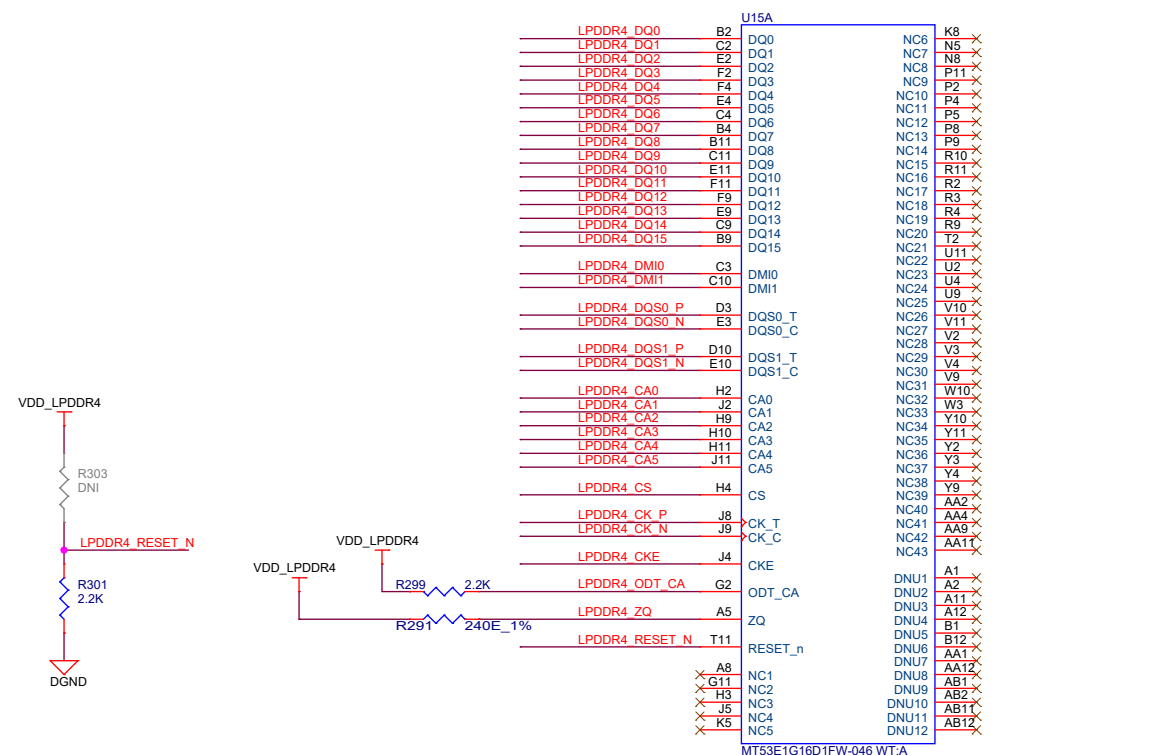
SOC LPDDR4 INTERFACE

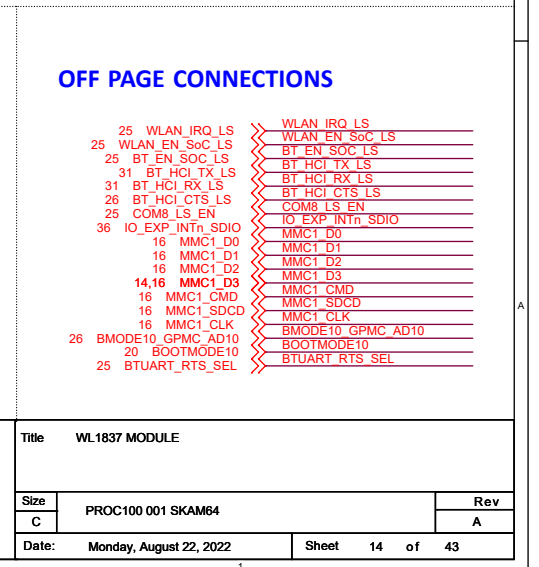
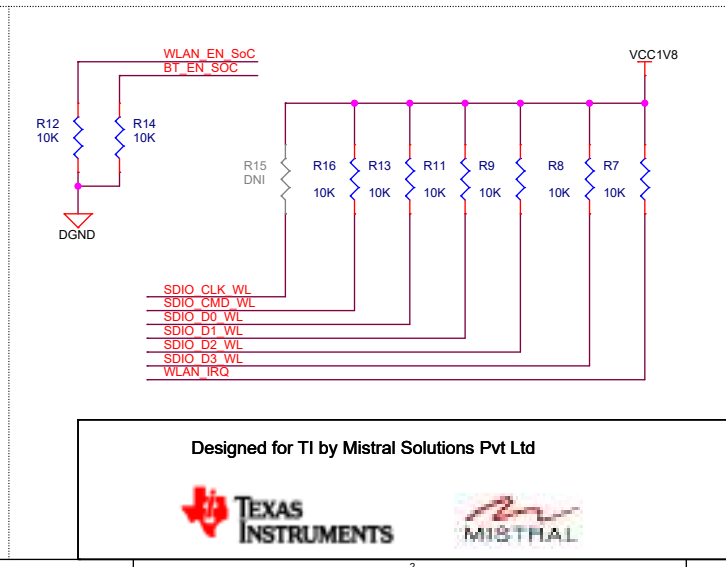
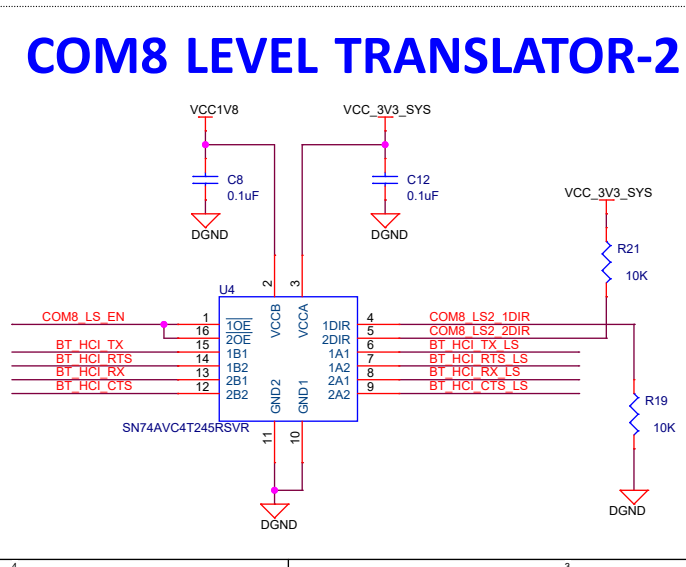
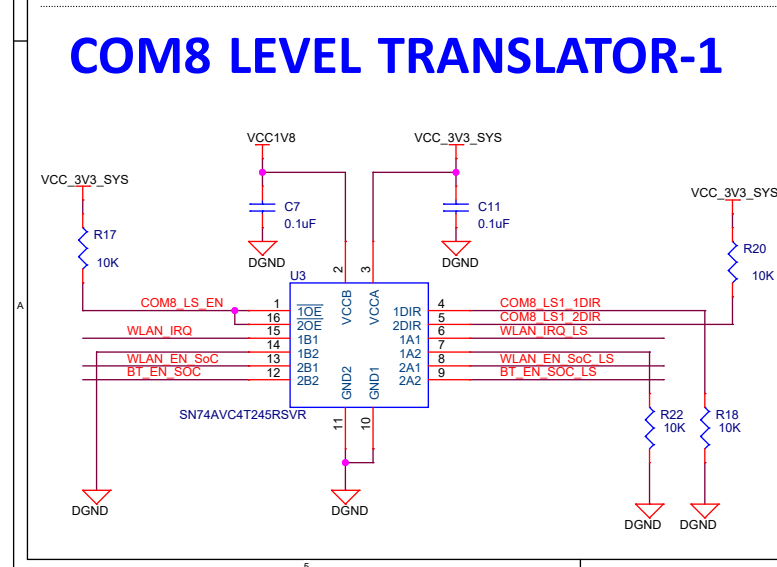
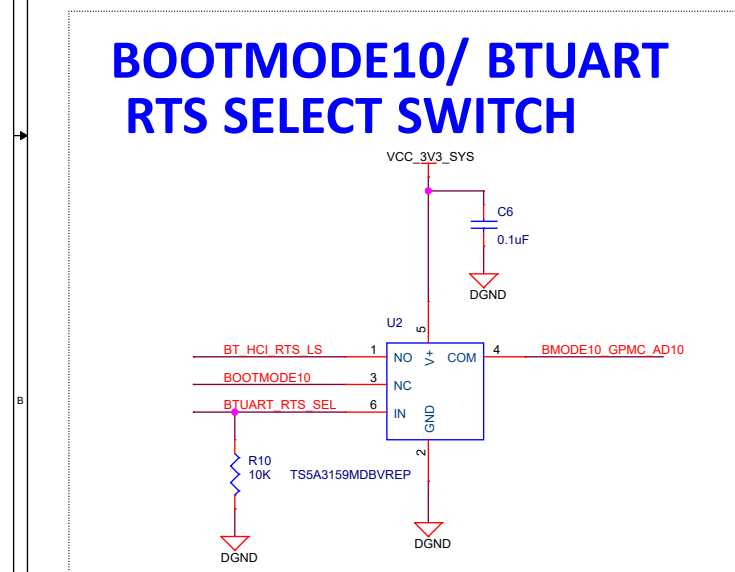
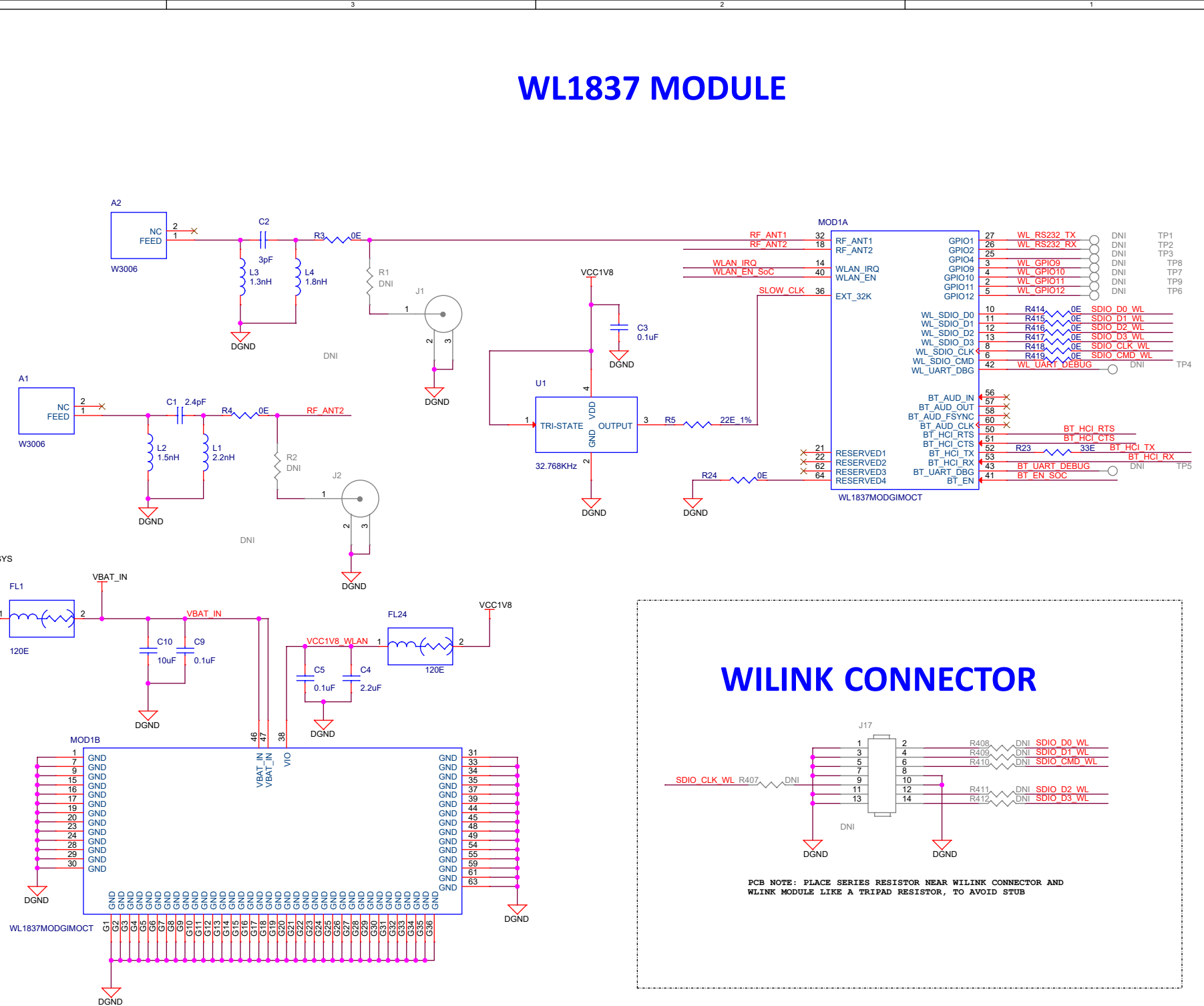
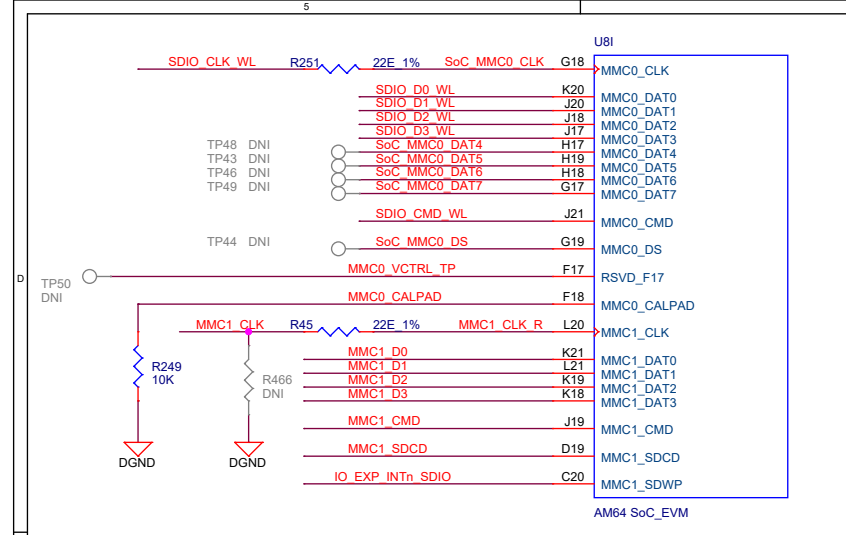


LPDDR4 POWER DECAPS

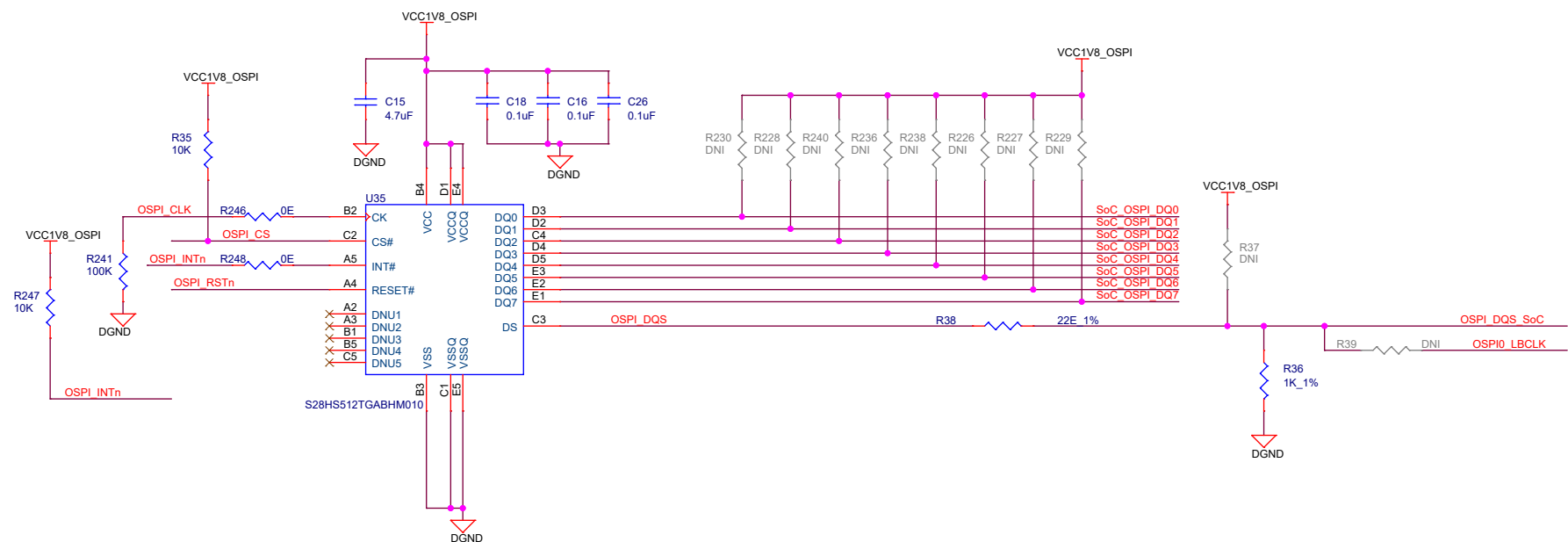


LPDDR4 DEVICE

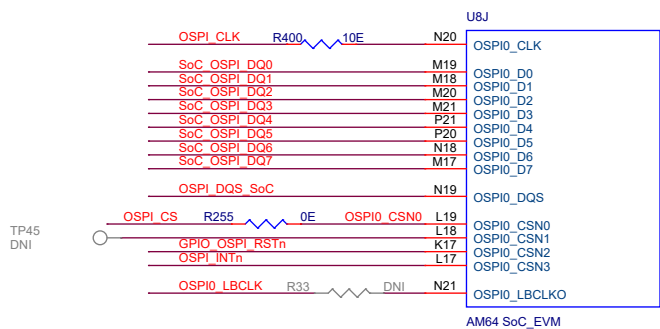




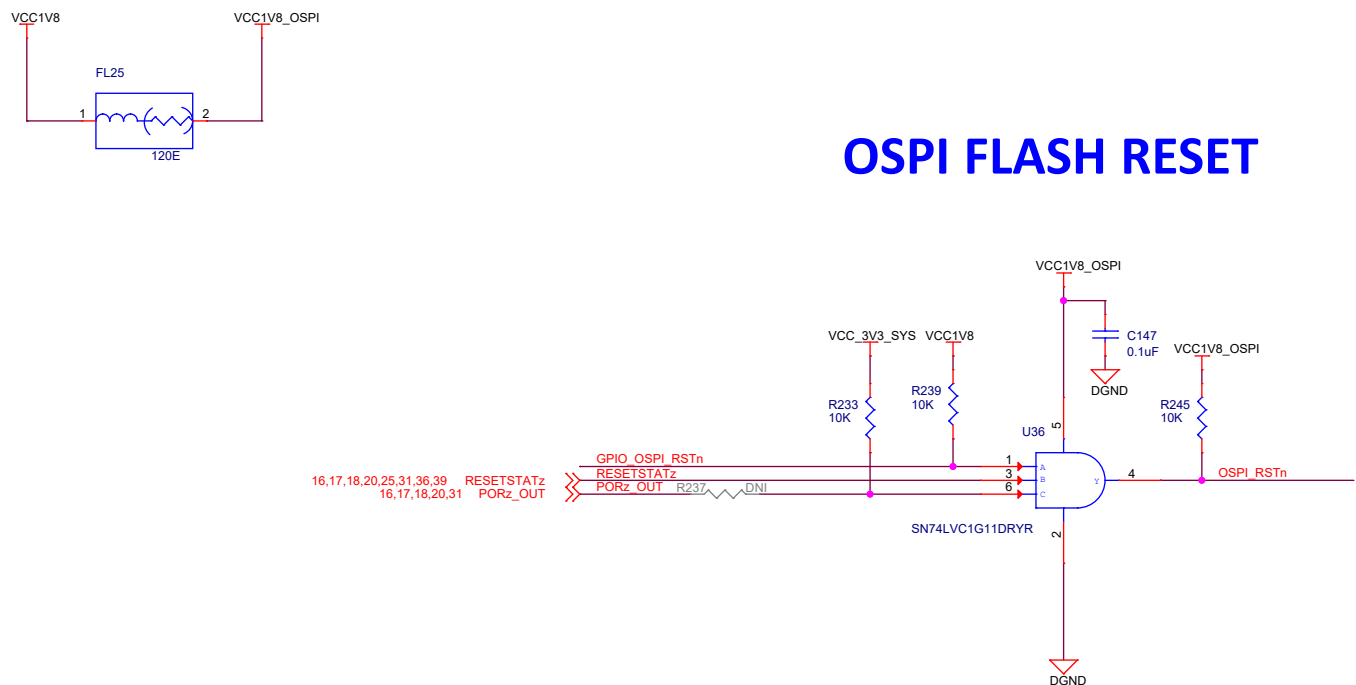
OSPI FLASH



SOC OSPI INTERFACE



OSPI FLASH RESET



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Title OSPI INTERFACE

Size PROC100 001 SKAM64

C

Date: Monday, August 22, 2022

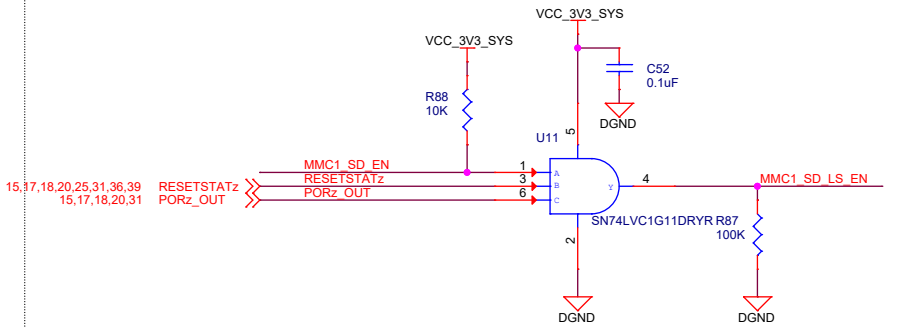
Sheet 15 of 43

Rev

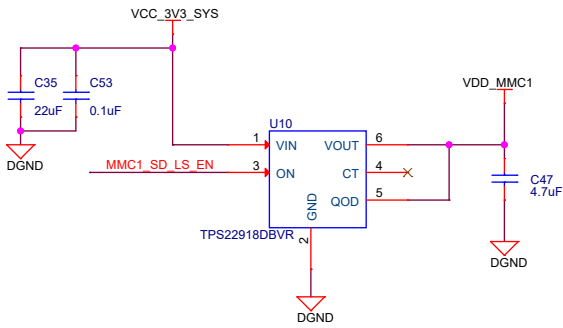
A

SD CARD INTERFACE

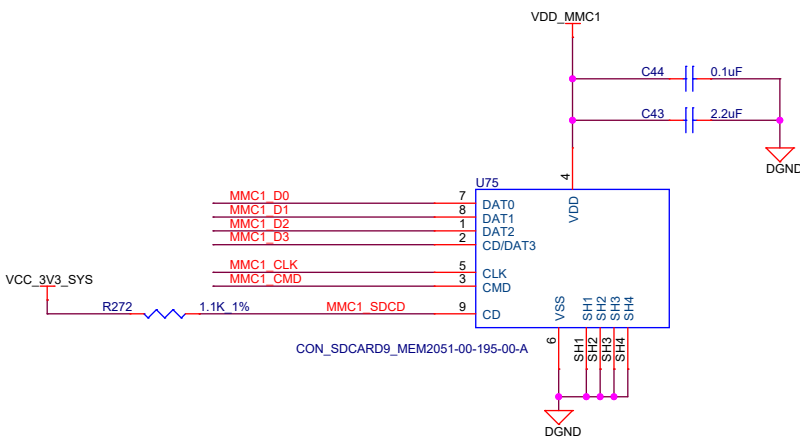
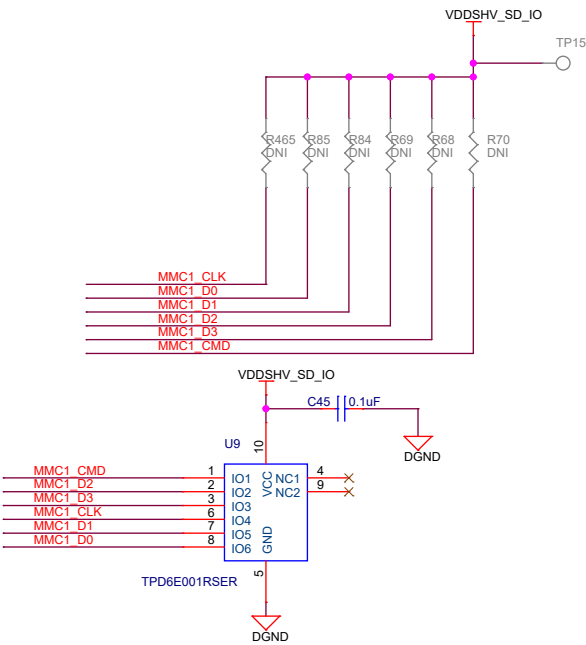
SD CARD RESET



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 PROC100 001 SKAM64

Date: Monday, August 22, 2022

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Rev

A

DP83867IRRGZ Pin Connections:

- Power Supply:**
 - VCC_3V3_SYS: 19, 39, 41, 43, 45, 47, 49
 - VDD_PHY_2V5: 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49
 - VDD_1V0: 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50
- Control Signals:**
 - TX_D0: 28
 - TX_D1: 27
 - TX_D2: 26
 - TX_D3: 25
 - TX_CTL: 29
 - TX_CLK: 37
 - TX_EN/TX_CTRL: 37
 - RX_D0: 33
 - RX_D1: 34
 - RX_D2: 35
 - RX_D3: 36
 - RX_CTL: 32
 - RX_CLK: 38
 - RX_DV/RX_CTRL: 38
 - ETH1_CLK: 15
 - ETH1_CLK_OUT: 18
 - MDIO: 16
 - MDIO: 17
 - INT/PWDN: 44
 - RBIAStn: 12
 - RESETn: 43
 - GND: 49
- GPIOs:**
 - GPIO_0: 39
 - GPIO_1: 40
- Other Connections:**
 - TP13: 47
 - TP14: 48

Internal Components:

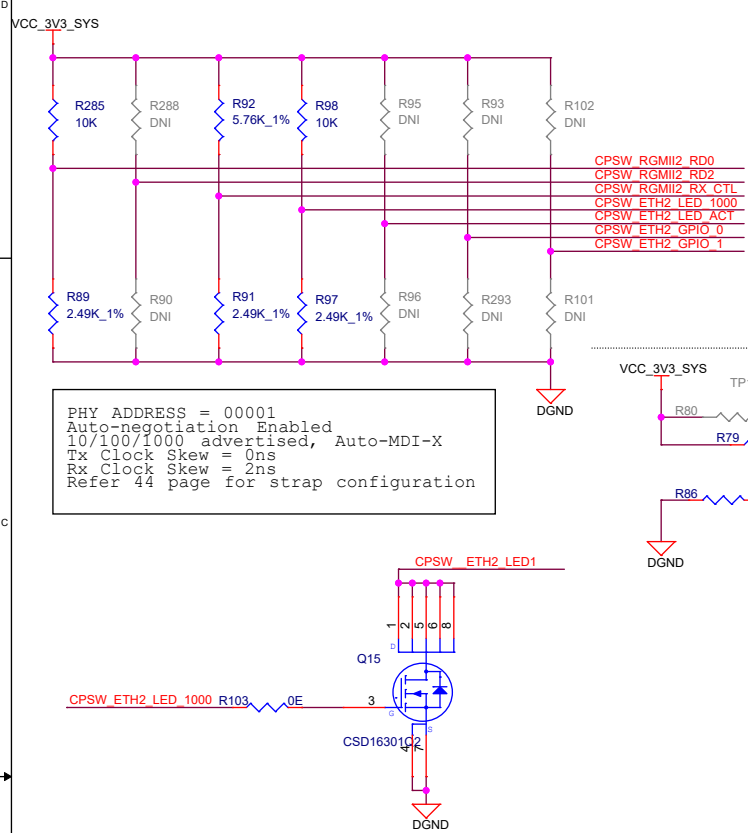
- Q12: MOSFET
- CSD1630 10: Resistor
- R477 220E: Resistor
- R478 0E: Resistor
- R295 0E: Resistor
- R28 0E: Resistor
- R25 0E: Resistor

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 a common ground (DGND).

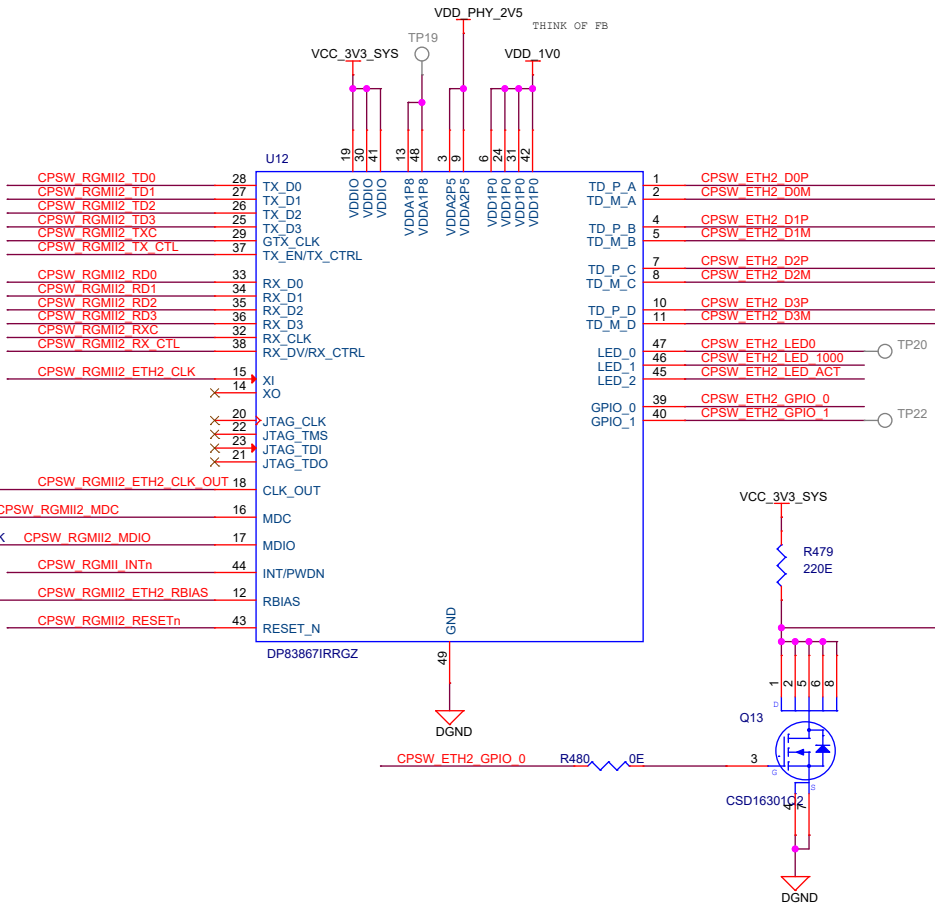
- VDD_1V0:** This diagram shows a series of capacitors connected to the VDD_1V0 rail. The capacitors are labeled C23 (0.1uF), C29 (0.1uF), C13 (0.1uF), C24 (0.1uF), C156 (1uF), C146 (1uF), C145 (1uF), C135 (1uF), and C141 (10uF). The ground connection is labeled DGND.
- VCC_3V3_SYS:** This diagram shows a series of capacitors connected to the VCC_3V3_SYS rail. The capacitors are labeled C28 (0.1uF), C19 (0.1uF), C14 (0.1uF), C157 (1uF), C140 (1uF), C134 (1uF), and C131 (10uF). The ground connection is labeled DGND.
- VDD_PHY_2V5:** This diagram shows a series of capacitors connected to the VDD_PHY_2V5 rail. The capacitors are labeled C17 (0.1uF), C27 (0.1uF), C138 (1uF), C152 (1uF), and C137 (4.7uF). The ground connection is labeled DGND.

	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_CTL	↔	CPSW_RGMII1 RXC_CTL
	25	CPSW_RGMII1 TX_CTL	↔	CPSW_RGMII1 TX_CTL
	25	CPSW_RGMII1 TD0	↔	CPSW_RGMII1 TD0
	25	CPSW_RGMII1 TD1	↔	CPSW_RGMII1 TD1
	25	CPSW_RGMII1 TD2	↔	CPSW_RGMII1 TD2
	25	CPSW_RGMII1 TD3	↔	CPSW_RGMII1 TD3
	25	CPSW_RGMII1 TX_CTL	↔	CPSW_RGMII1 TX_CTL
	25	CPSW_RGMII1 TXC	↔	CPSW_RGMII1 TXC
	25	CPSW_RGMII1 TXC_CTL	↔	CPSW_RGMII1 TXC_CTL
	15,16,18,20,31	PORTZ_OUT	↔	PORTZ_OUT
25,31,39		CPSW_RGMII1_INTnPRU_INTn	↔	CPSW_RGMII1_INTnPRU_INTn
	17,36	GPIO_CPSW1_RST	↔	GPIO_CPSW1_RST
	29	CPSW_RGMII1_ETH1_CLK	↔	CPSW_RGMII1_ETH1_CLK
	18,25	CPSW_RGMII2_MDC	↔	CPSW_RGMII2_MDC
	18,25	CPSW_RGMII2_MDIO	↔	CPSW_RGMII2_MDIO
	18,25	CPSW_RGMII2_INTn	↔	CPSW_RGMII2_INTn

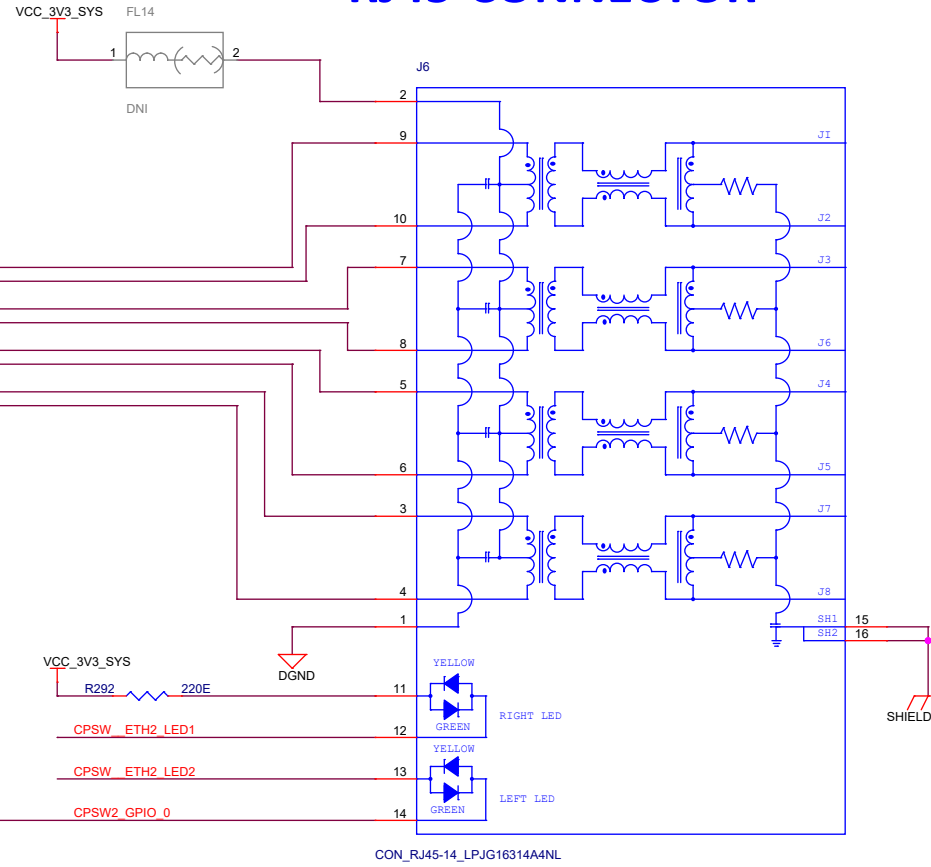
STRAPPING RESISTORS



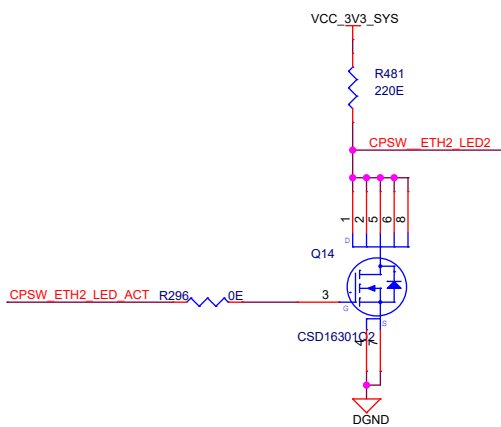
CPSW RGMII 2 - PHY



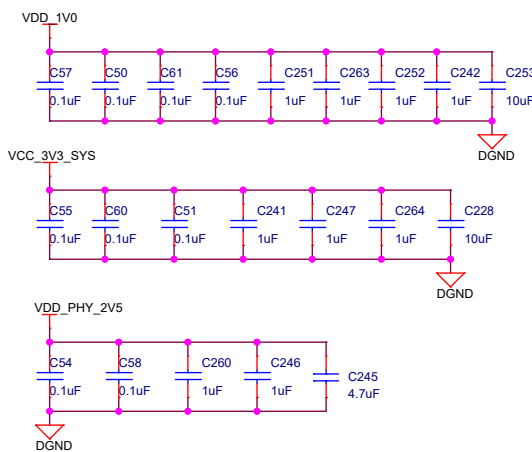
RJ45 CONNECTOR



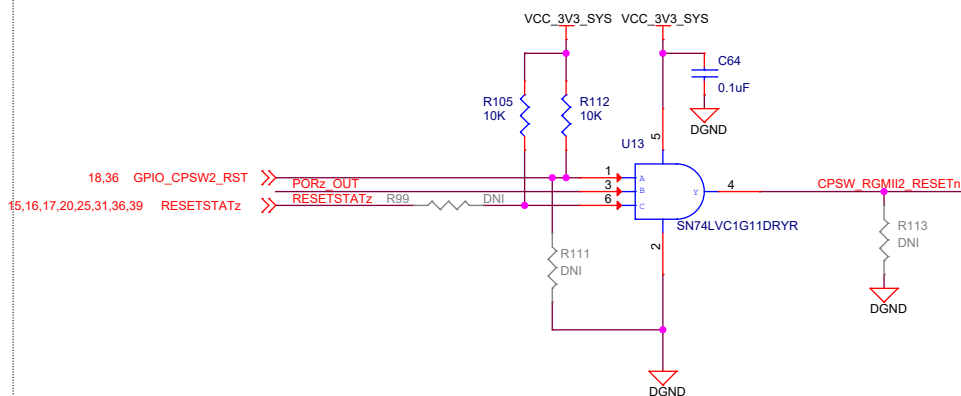
CPSW PHY-2 SPEED AND ACTIVITY LED's DRIVERS



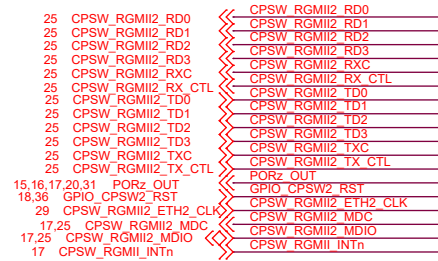
DECAPS



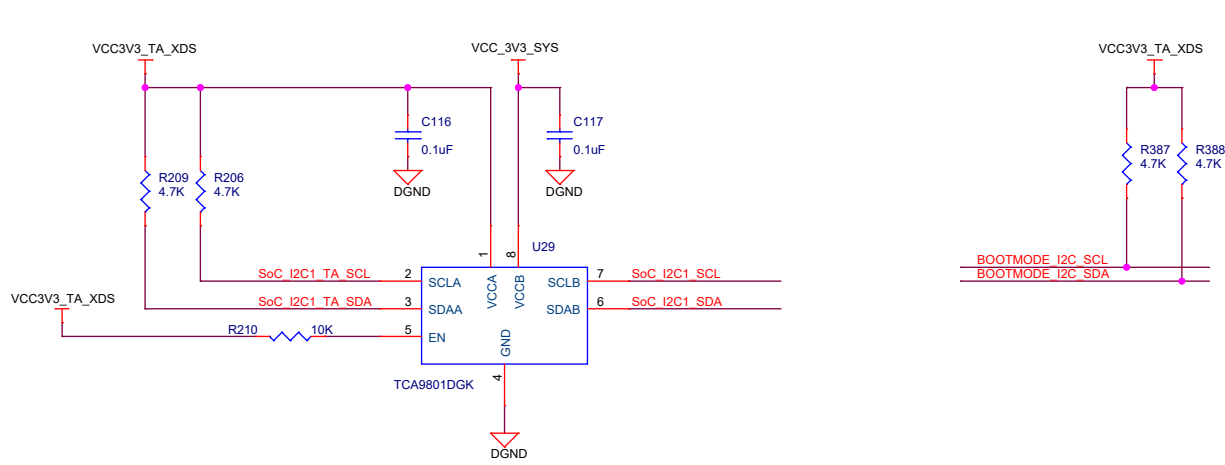
CPSW PHY-2 RESET



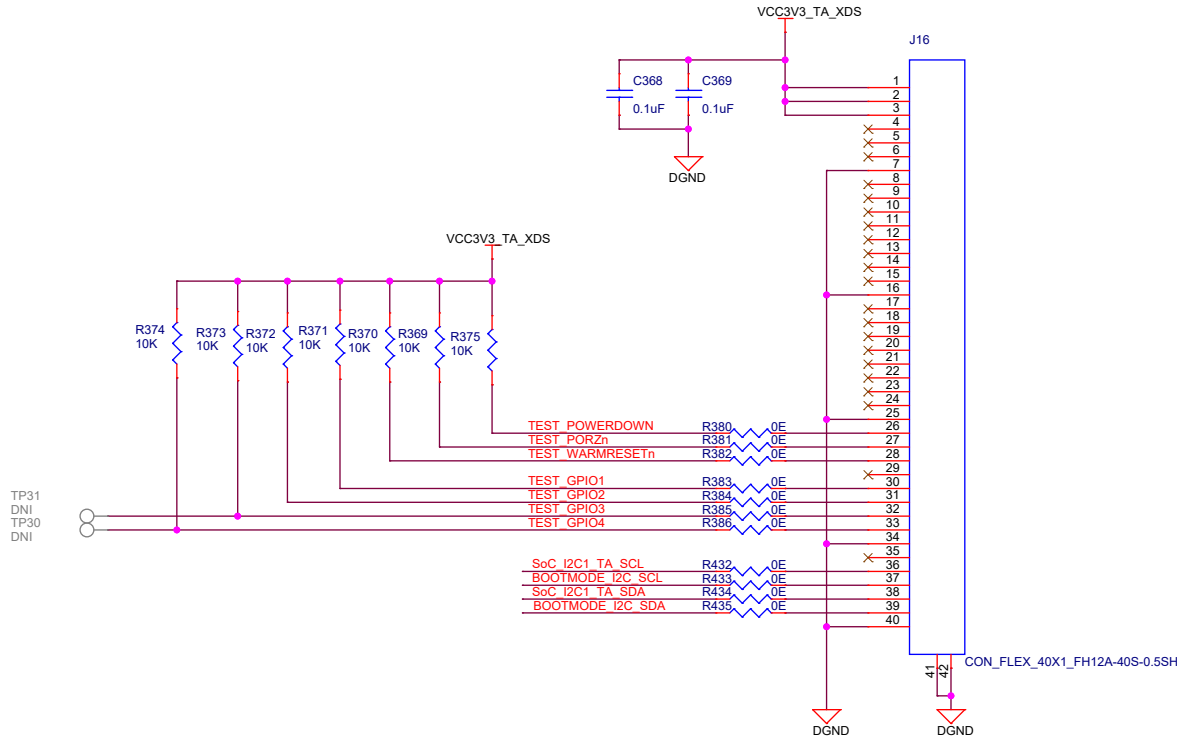
OFF PAGE CONNECTIONS



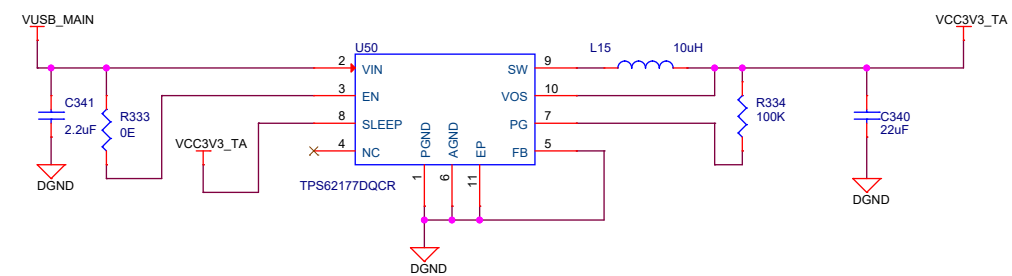
I2C BUS BUFFER



40-PIN AUTOMATION HEADER



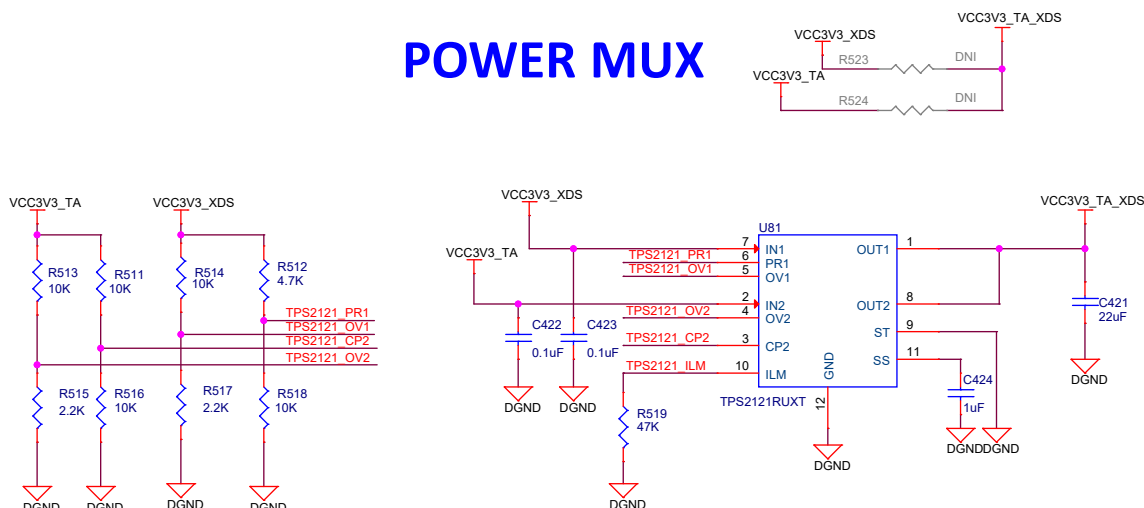
TEST AUTOMATION BOARD POWER



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

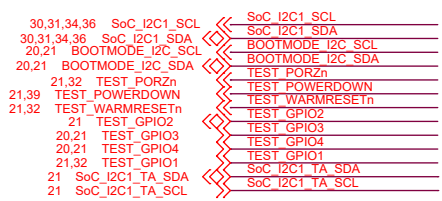
POWER MUX



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

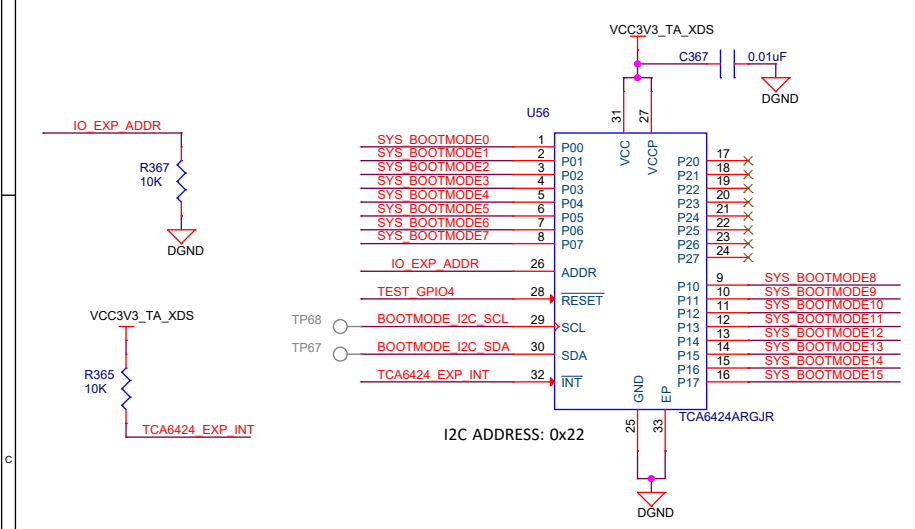


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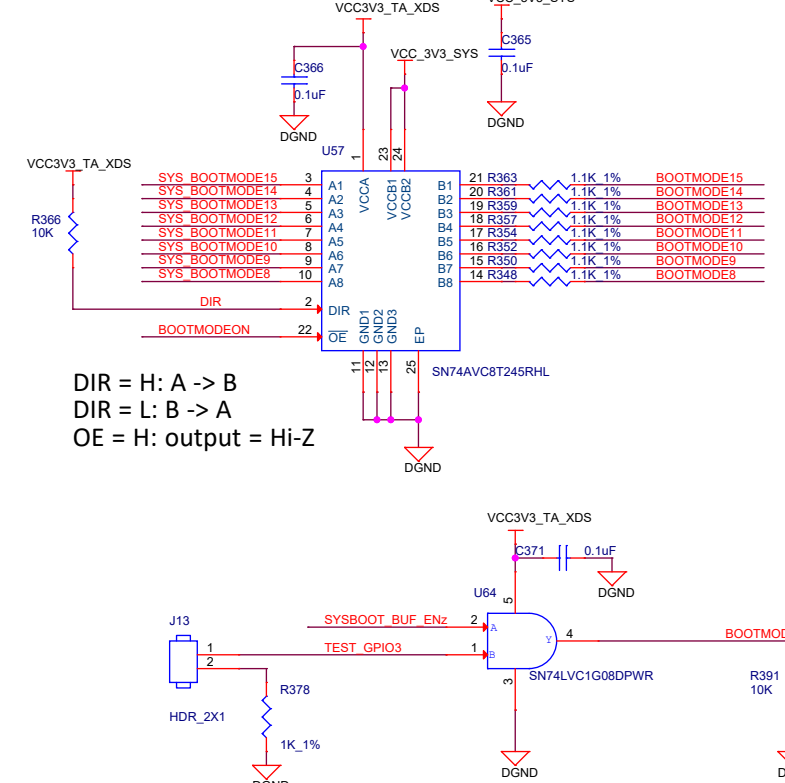
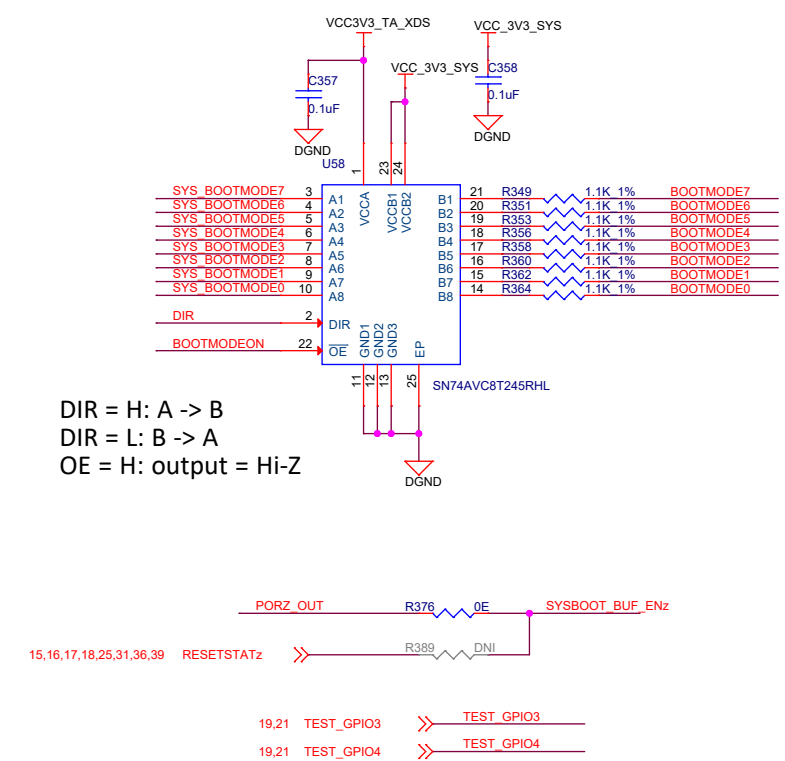


Title TEST AUTOMATION		
Size	PROC100 001 SKAM64	Rev
C		A
Date:	Monday, August 22, 2022	Sheet 19 of 43

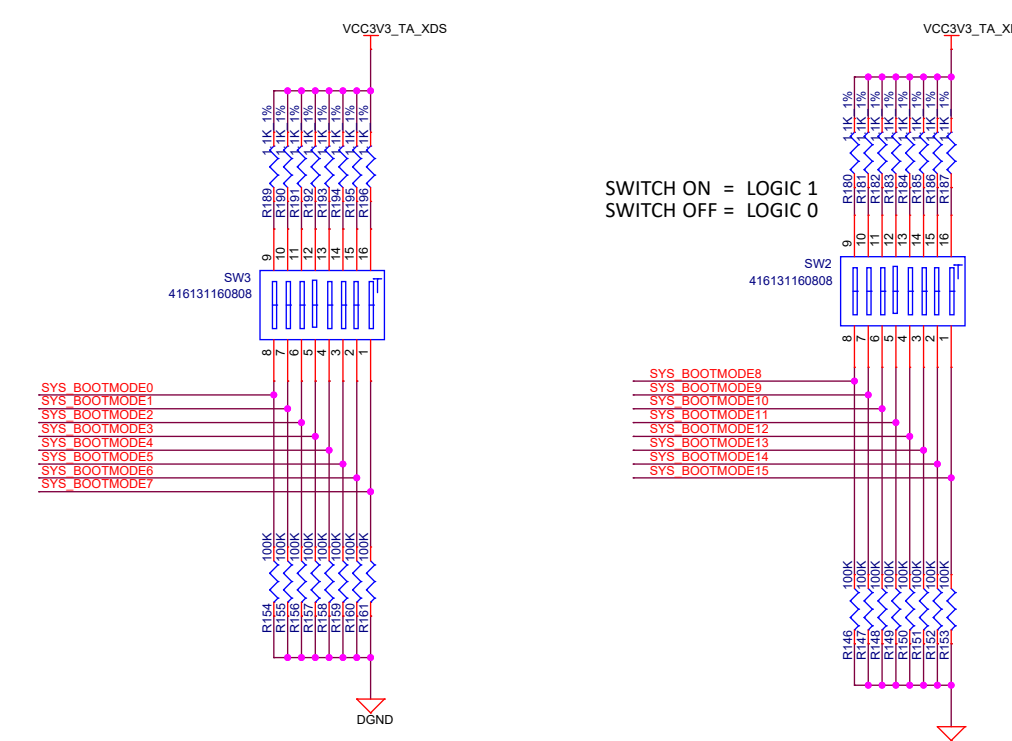
IO EXPANDER



BOOT MODE BUFFER



BOOT MODE SWITCHES



OFF PAGE CONNECTIONS

26	BOOTMODE8	BOOTMODE8
26	BOOTMODE9	BOOTMODE9
14	BOOTMODE10	BOOTMODE10
26	BOOTMODE11	BOOTMODE11
26	BOOTMODE12	BOOTMODE12
26	BOOTMODE13	BOOTMODE13
26	BOOTMODE14	BOOTMODE14
26	BOOTMODE15	BOOTMODE15
26	BOOTMODE0	BOOTMODE0
26	BOOTMODE1	BOOTMODE1
26	BOOTMODE2	BOOTMODE2
26	BOOTMODE3	BOOTMODE3
26	BOOTMODE4	BOOTMODE4
26	BOOTMODE5	BOOTMODE5
26	BOOTMODE6	BOOTMODE6
26	BOOTMODE7	BOOTMODE7
15,16,17,18,31	PORZ_OUT	PORZ_OUT
19,21	BOOTMODE_I2C_SCL	BOOTMODE_I2C_SCL
19,21	BOOTMODE_I2C_SDA	BOOTMODE_I2C_SDA

BOOT MODES SUPPORTED

1. OSPI
2. MMC1 - SD CARD
3. CPSW Ethernet
4. USB Device
5. Ethernet

MCU Boot Mode Pins to be Finalized

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Title BOOT MODE BUFFER & SWITCHES

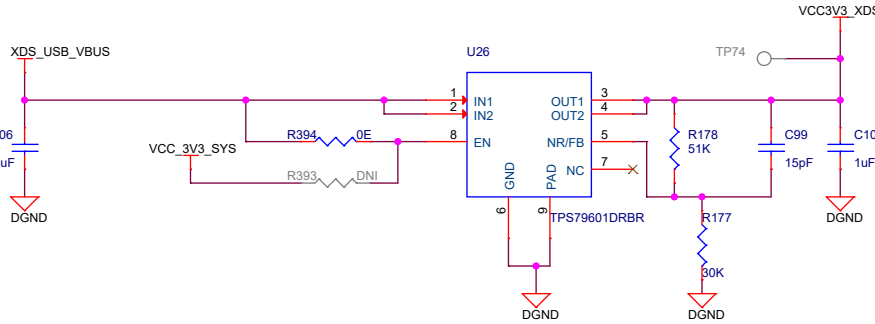
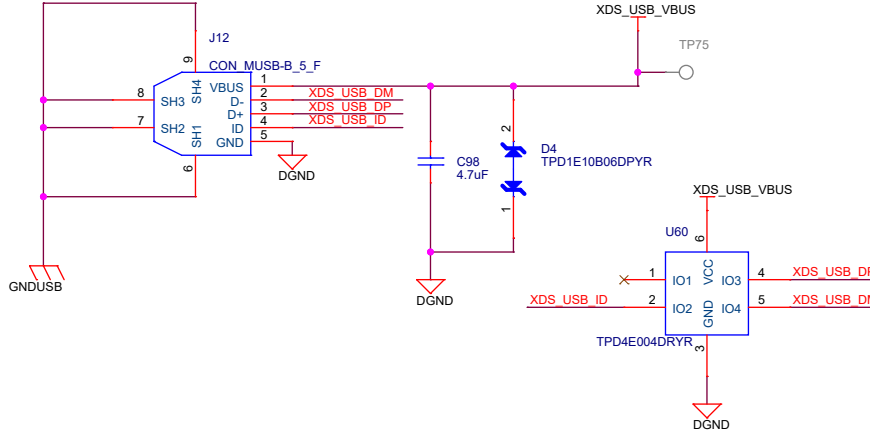
Size PROC100 001 SKAM64

C Date: Monday, August 22, 2022

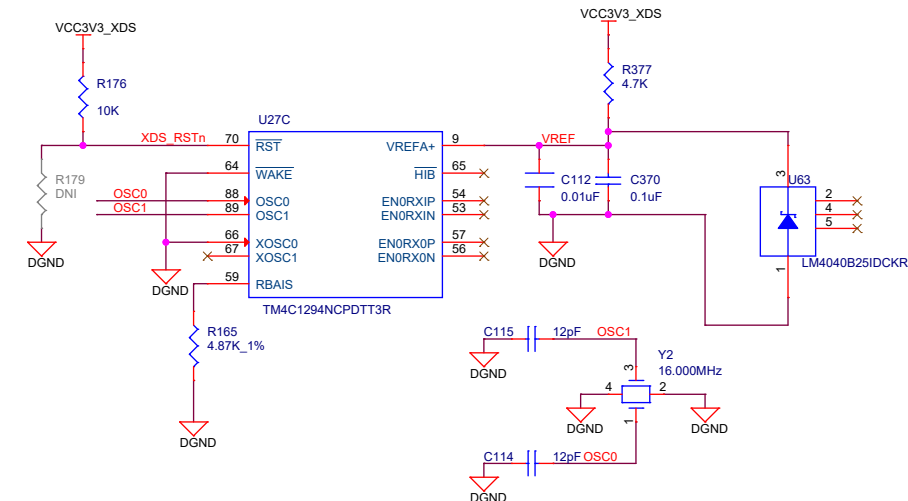
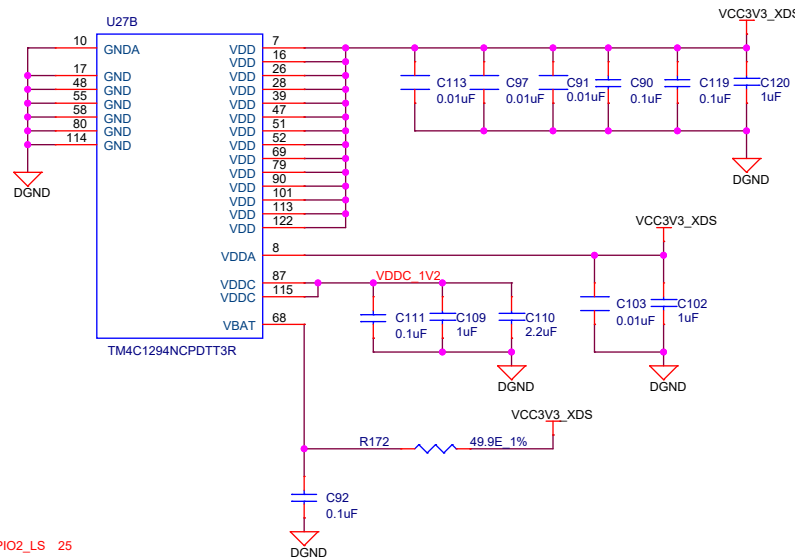
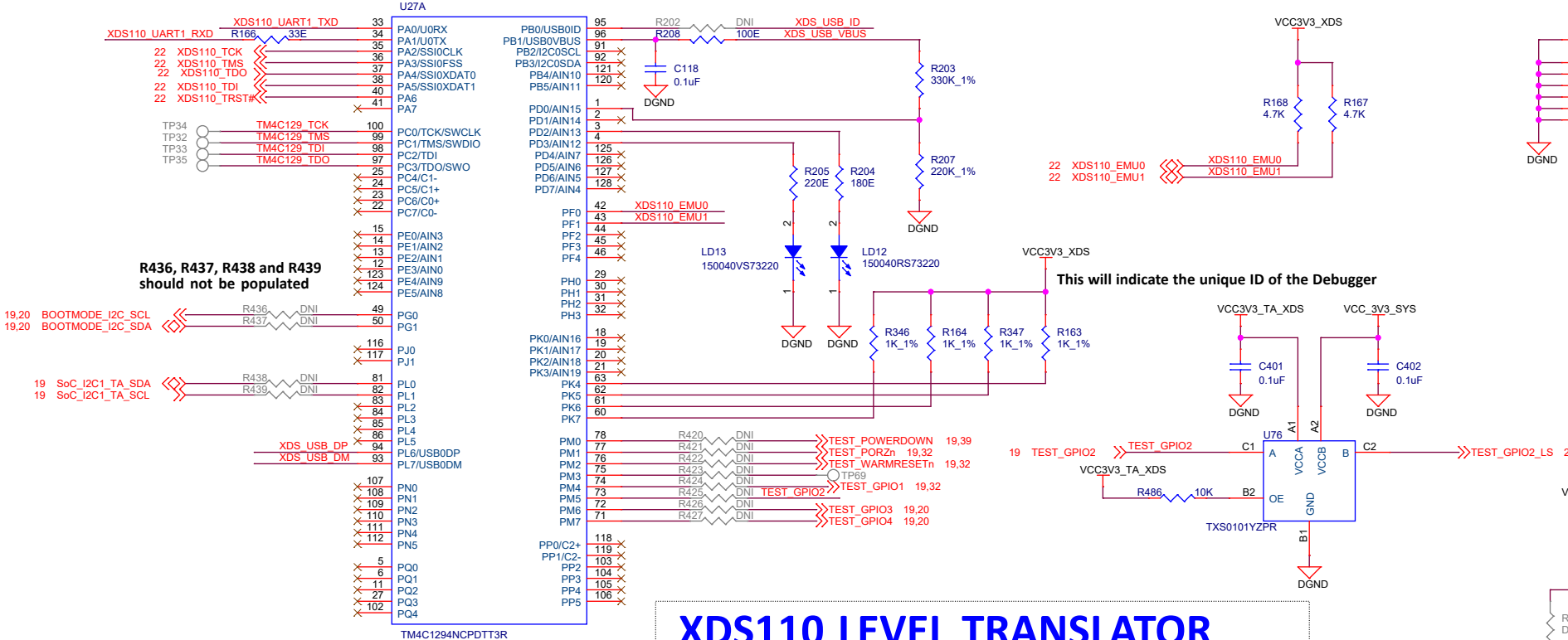
Sheet 20 of 43

Rev A

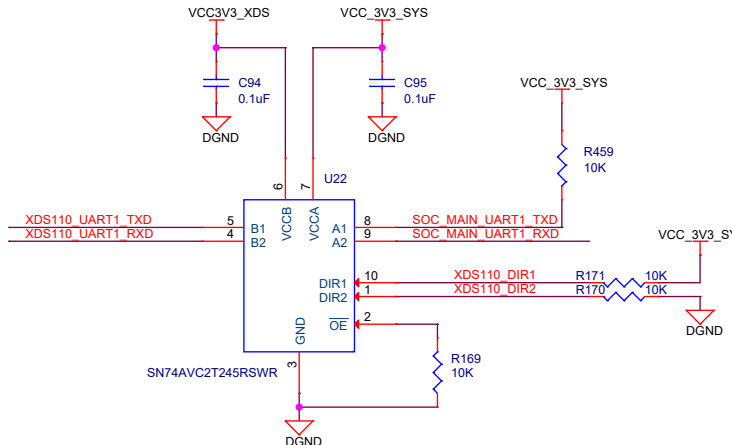
XDS110 POWER



XDS110 DEBUGGER



XDS110 LEVEL TRANSLATOR



OFF PAGE CONNECTIONS



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Title XDS110 DEBUGGER

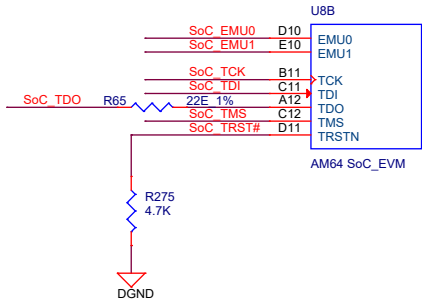
Size	PROC100 001 SKAM6
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Date: Monday, August 22, 2011

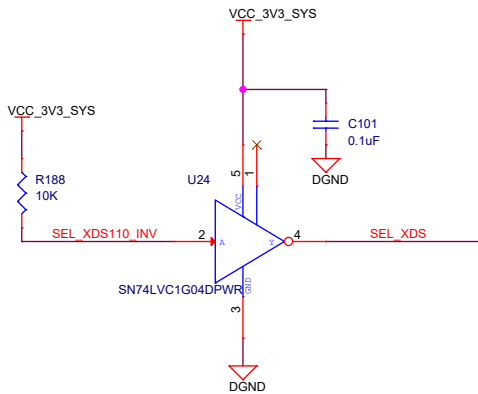
Sheet 21 of 43

Rev

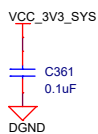
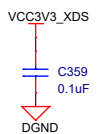
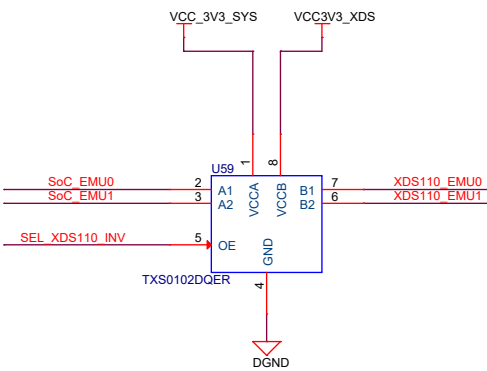
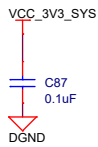
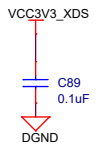
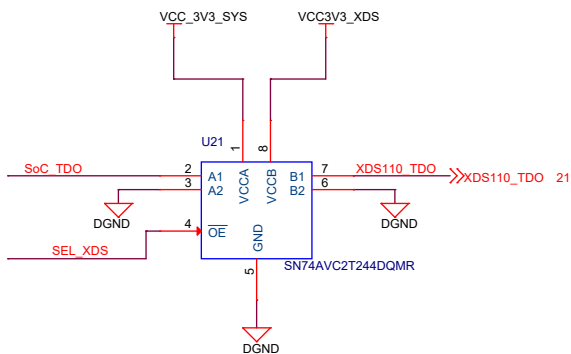
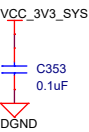
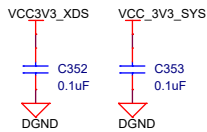
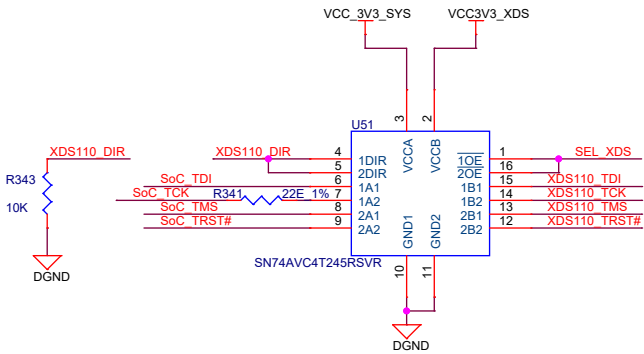
JTAG SoC SECTION



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

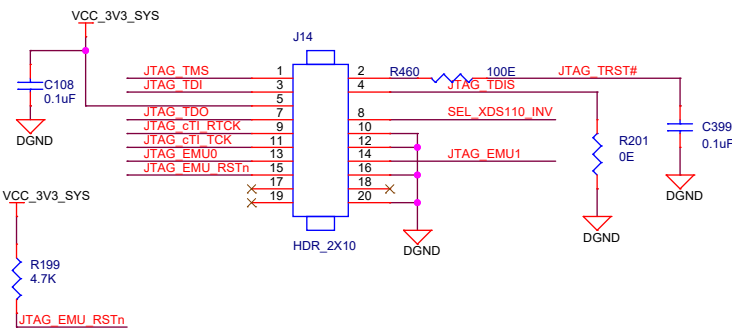
Size PROC100 001 SKAM64

Rev

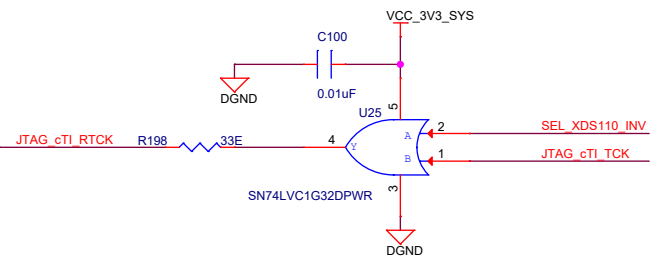
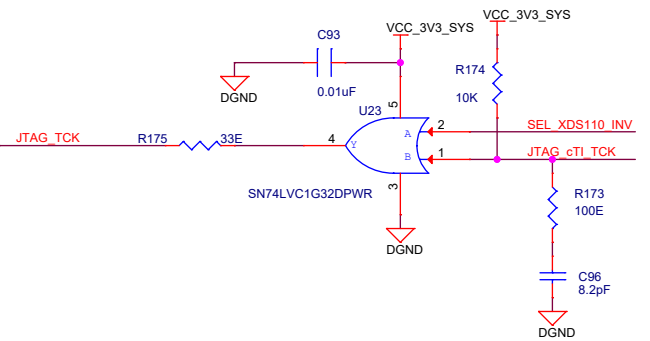
Date: Monday, August 22, 2022

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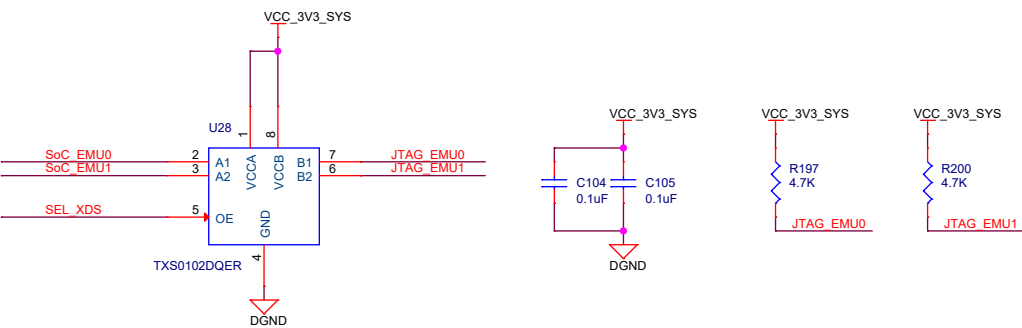
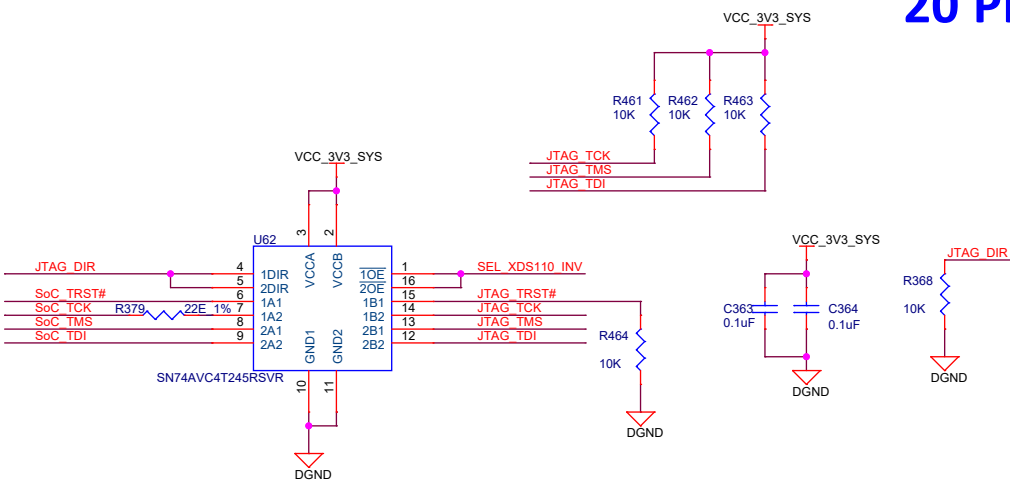
JTAG 20 PIN cTI CONNECTOR



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#
32	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 PROC100 001 SKAM64

Date: Monday, August 22, 2022

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D



1



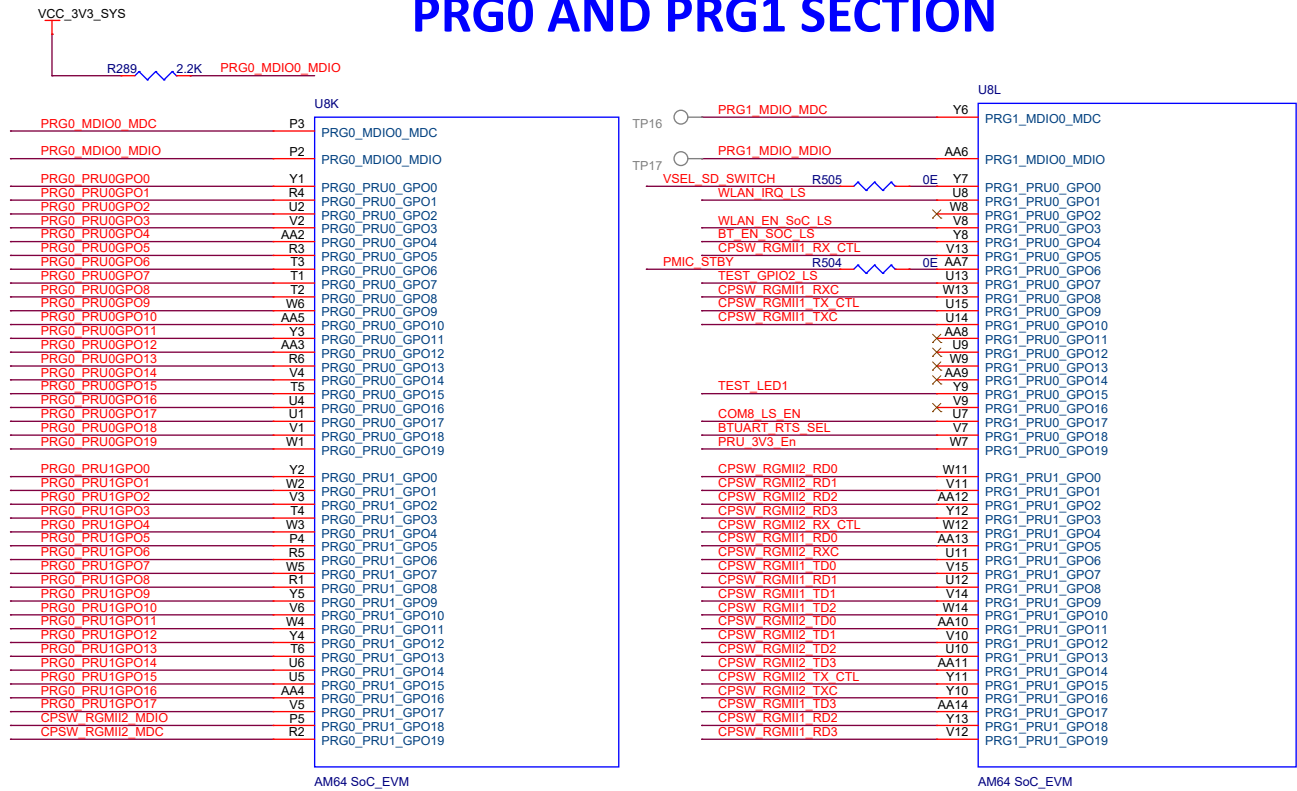
B



1

Rev
A

PRG0 AND PRG1 SECTION



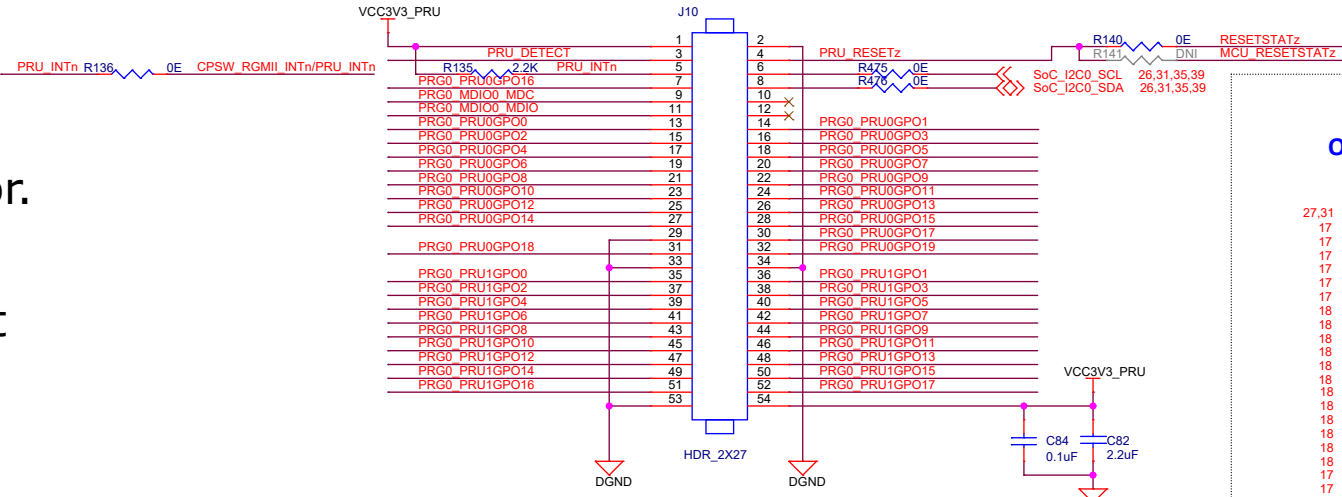
PRU CONNECTOR

NOTE:

AM64x Starter Kit shall not be powered through the 3V3 pins on the PRU Connector.

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

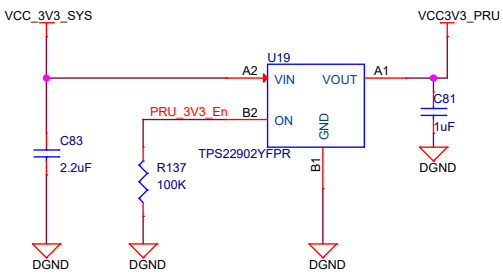
3V3 supply of User Expansion Connector is limited to sourcing 500mA max.



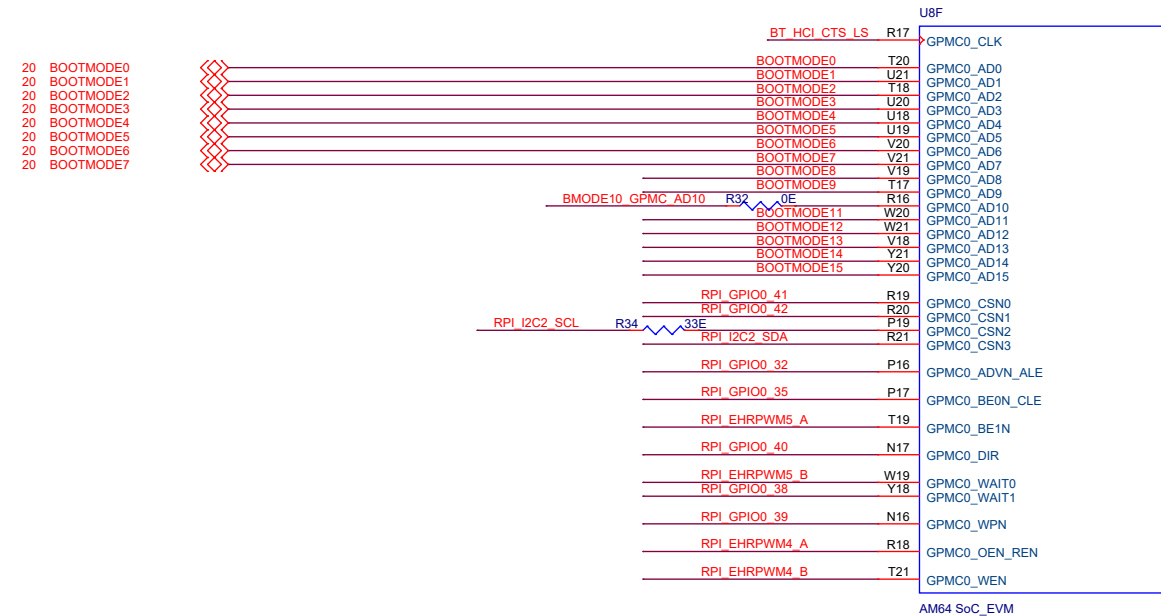
OFF PAGE CONNECTIONS

27,31	MCU_RESETSTATz	>>	MCU_RESETSTATz
17	CPSW_RGMII1_RD0	>>	CPSW_RGMII1_RD0
17	CPSW_RGMII1_RD1	>>	CPSW_RGMII1_RD1
17	CPSW_RGMII1_RD2	>>	CPSW_RGMII1_RD2
17	CPSW_RGMII1_RD3	>>	CPSW_RGMII1_RD3
17	CPSW_RGMII1_RXC	>>	CPSW_RGMII1_RXC
17	CPSW_RGMII1_RX_CTL	>>	CPSW_RGMII1_RX_CTL
17	CPSW_RGMII2_RD0	>>	CPSW_RGMII2_RD0
18	CPSW_RGMII2_RD1	>>	CPSW_RGMII2_RD1
18	CPSW_RGMII2_RD2	>>	CPSW_RGMII2_RD2
18	CPSW_RGMII2_RD3	>>	CPSW_RGMII2_RD3
18	CPSW_RGMII2_RXC	>>	CPSW_RGMII2_RXC
18	CPSW_RGMII2_RX_CTL	>>	CPSW_RGMII2_RX_CTL
18	CPSW_RGMII2_TD0	>>	CPSW_RGMII2_TD0
18	CPSW_RGMII2_TD1	>>	CPSW_RGMII2_TD1
18	CPSW_RGMII2_TD2	>>	CPSW_RGMII2_TD2
18	CPSW_RGMII2_TD3	>>	CPSW_RGMII2_TD3
18	CPSW_RGMII2_TXC	>>	CPSW_RGMII2_TXC
18	CPSW_RGMII2_TX_CTL	>>	CPSW_RGMII2_TX_CTL
18	CPSW_RGMII1_TD0	>>	CPSW_RGMII1_TD0
17	CPSW_RGMII1_TD1	>>	CPSW_RGMII1_TD1
17	CPSW_RGMII1_TD2	>>	CPSW_RGMII1_TD2
17	CPSW_RGMII1_TD3	>>	CPSW_RGMII1_TD3
17	CPSW_RGMII1_TXC	>>	CPSW_RGMII1_TXC
17	CPSW_RGMII1_TX_CTL	>>	CPSW_RGMII1_TX_CTL
36	PRU_DETECT	>>	PRU_DETECT
17,31,39	CPSW_RGMII1_INTn/PRU_INTn	>>	CPSW_RGMII1_INTn/PRU_INTn
15,16,17,18,20,31,36,39	RESETSTATz	>>	RESETSTATz
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_STBY	>>	PMIC_STBY

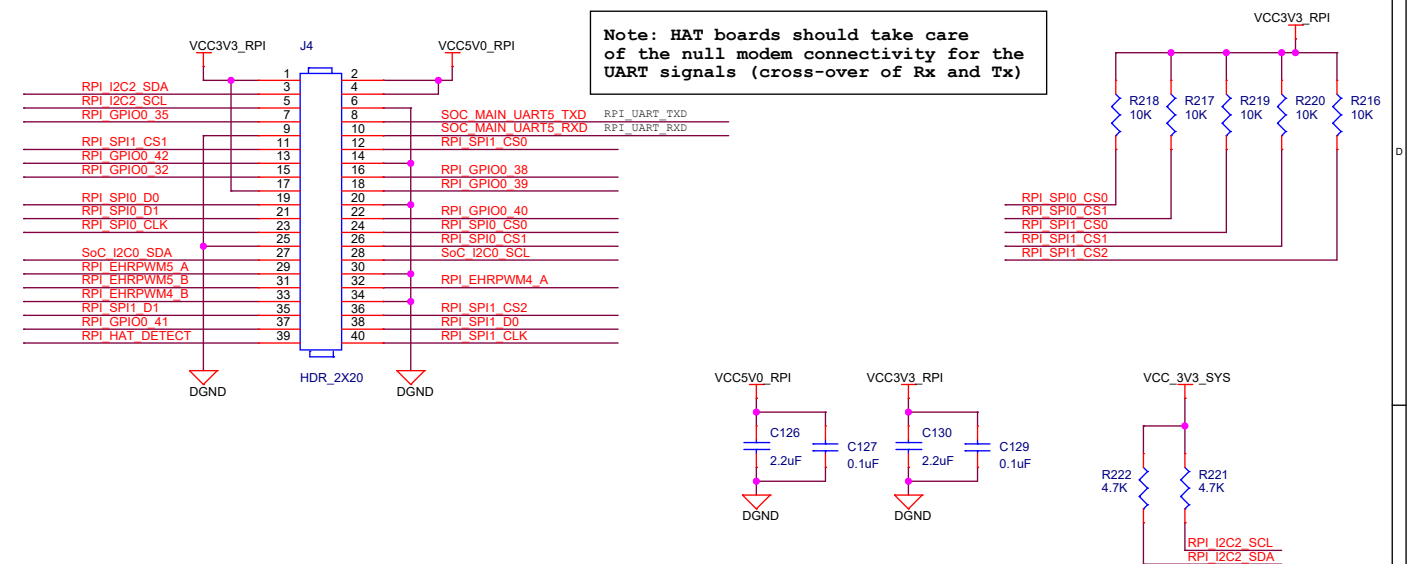
POWER SWITCH FOR 3.3V TO PRU CONNECTOR



GPMC SECTION



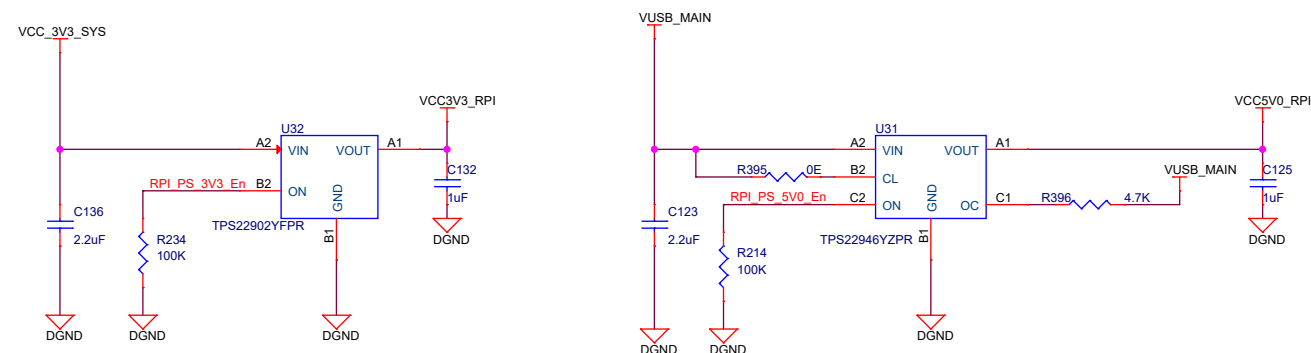
USER EXPANSION CONNECTOR



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:

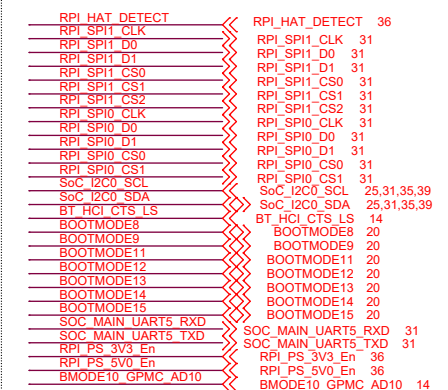
AM64x Starter Kit shall not be powered through the 5V0 or 3V3 pins on the 40-pin User Expansion Connector.

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.

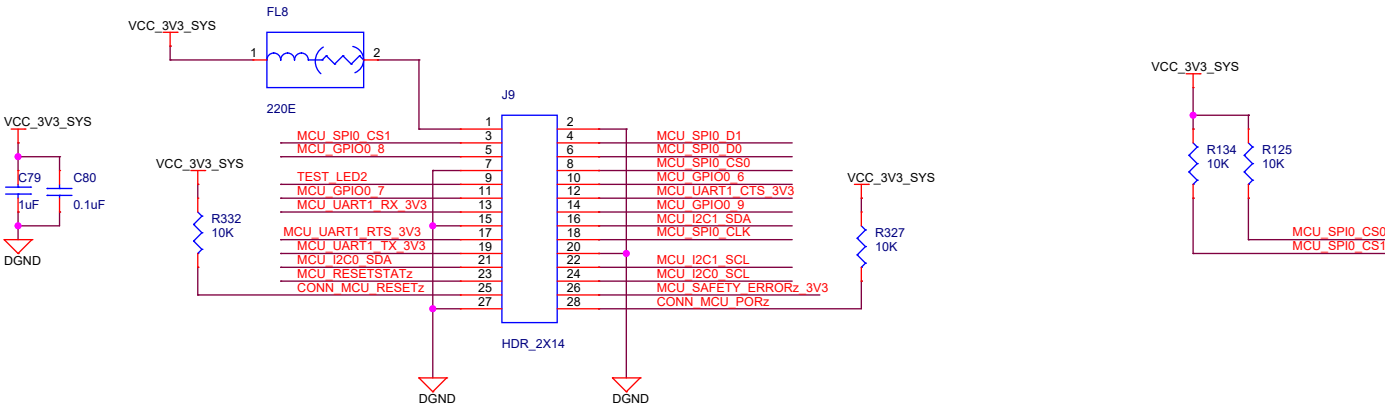
3V3 supply of User Expansion Connector is limited to sourcing 500mA max.

OFF PAGE CONNECTIONS

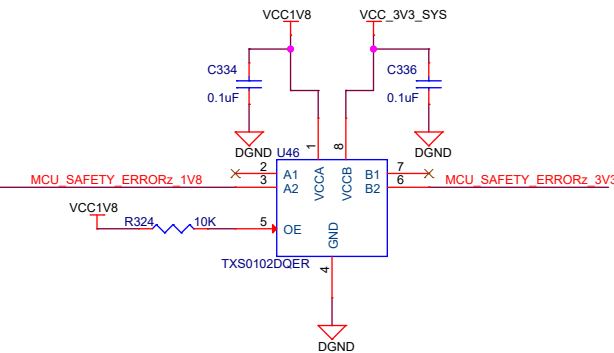


MCU CONNECTOR

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
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 SPI0_CLK
31	MCU_I2C0_SCL	MCU I2C1_SCL
31	MCU_I2C0_SCL	MCU I2C0_SCL
31	MCU_SAFETY_ERRORz_1V8	MCU SAFETY_ERRORz_1V8

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Title MCU CONNECTOR

Size PROC100 001 SKAM64

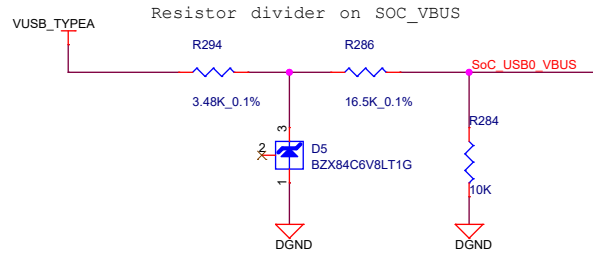
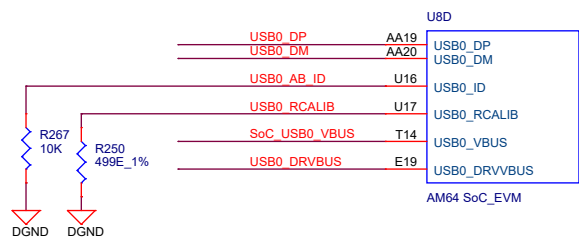
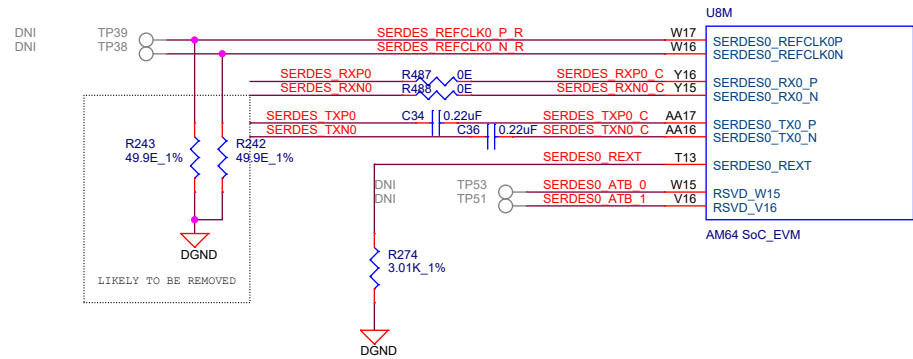
Date: Monday, August 22, 2022

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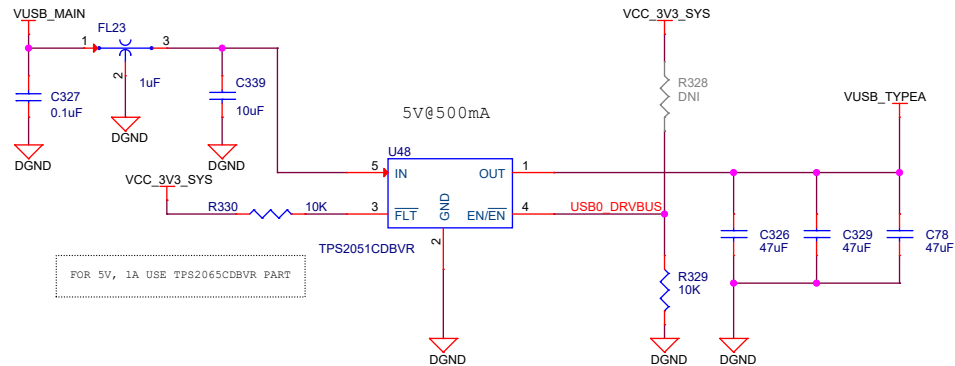
Rev

A

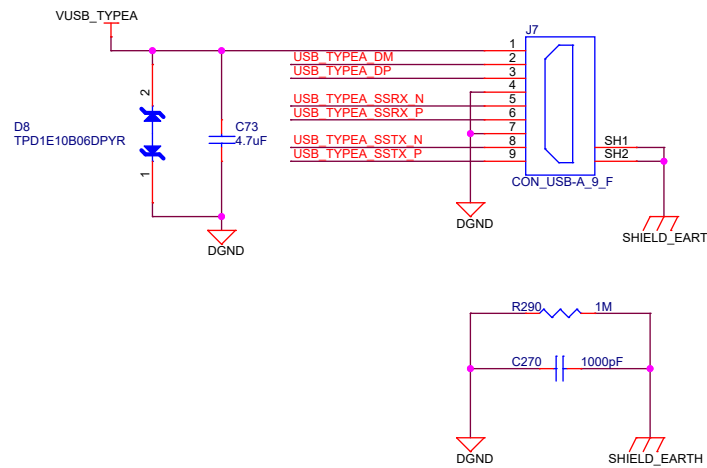
USB 3.0 INTERFACE



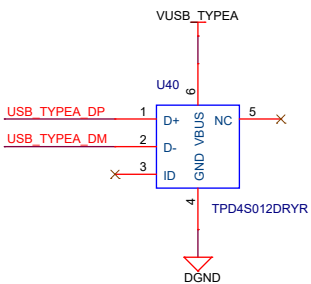
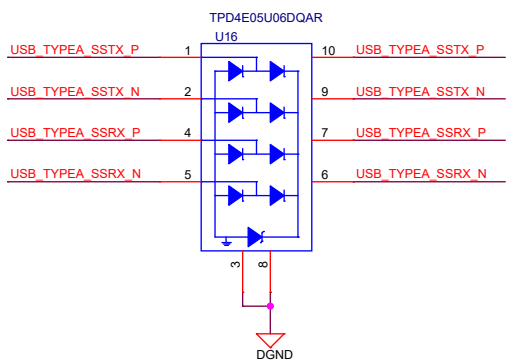
5V Power switch for USB 3.0 Device



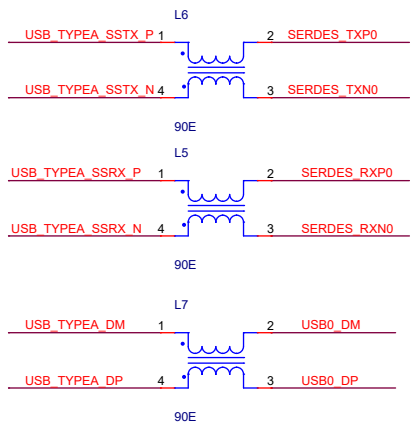
Type-A Connector



ESD DIODES



CHOKES



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Title USB 3.0 INTERFACE

Size PROC100 001 SKAM64

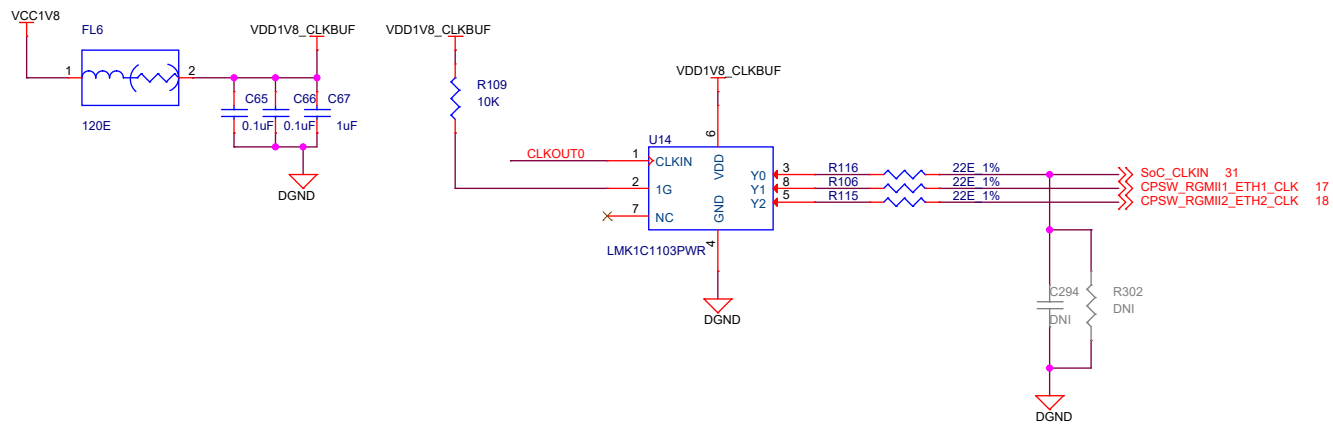
Date: Monday, August 22, 2022

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Rev

A

ETHERNET PHY CLOCK BUFFER



OFF PAGE CONNECTIONS

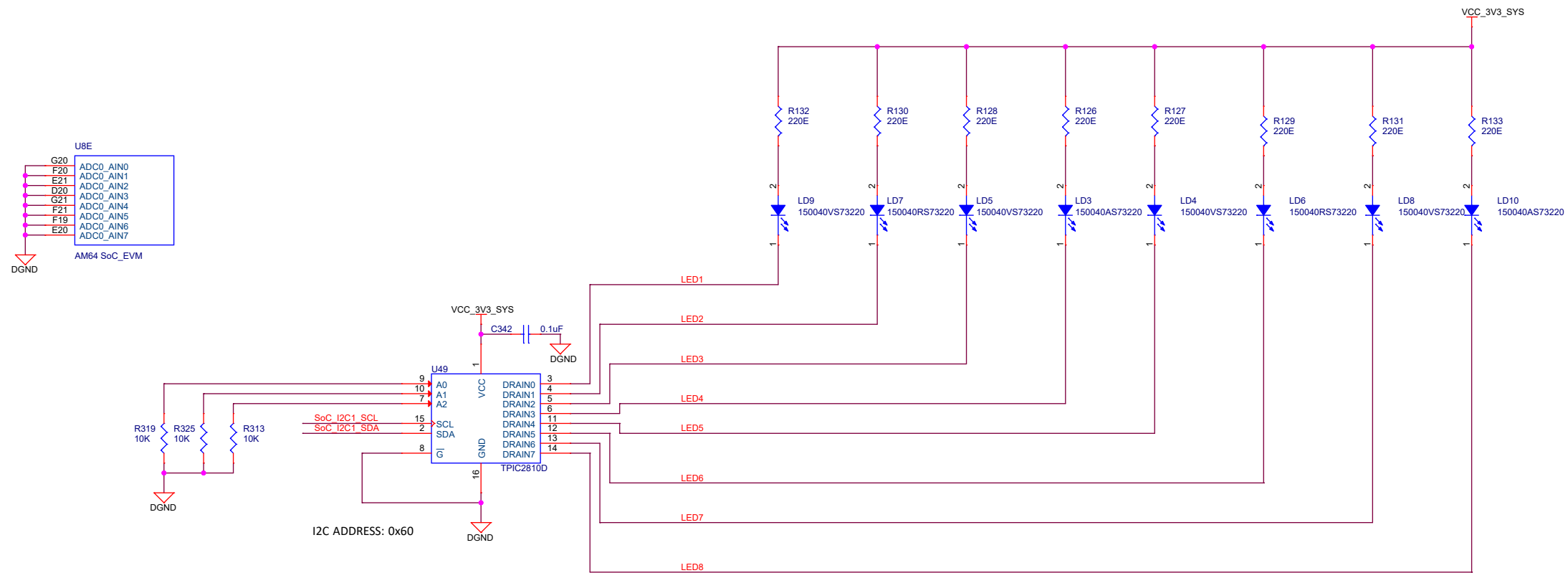
31,37 CLKOUT0 << CLKOUT0

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Title ETHERNET PHY CLOCK BUFFER		
Size	PROC100 001 SKAM64	Rev
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Date:	Monday, August 22, 2022	Sheet 29 of 43

INDUSTRIAL COMMUNICATION LED's



OFF PAGE CONNECTIONS

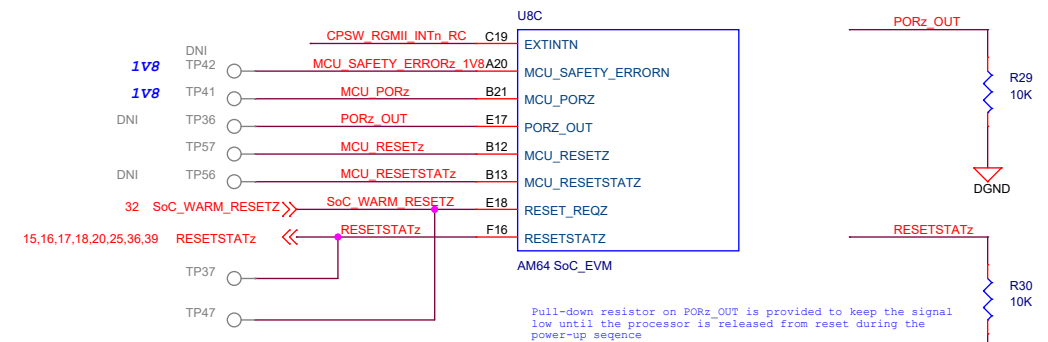
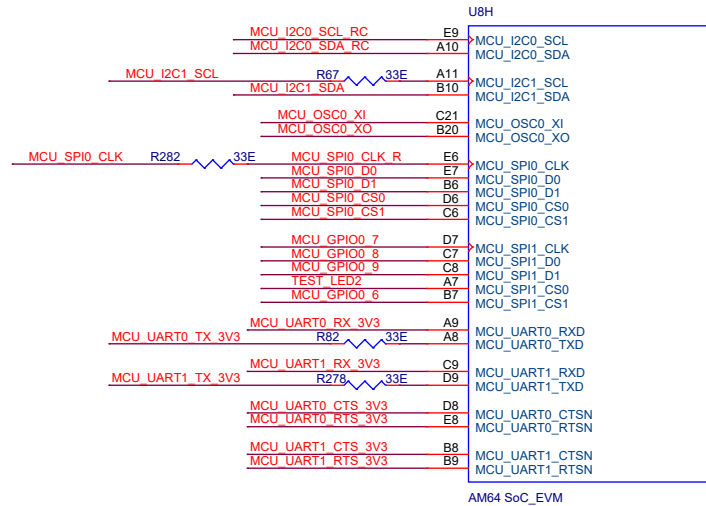
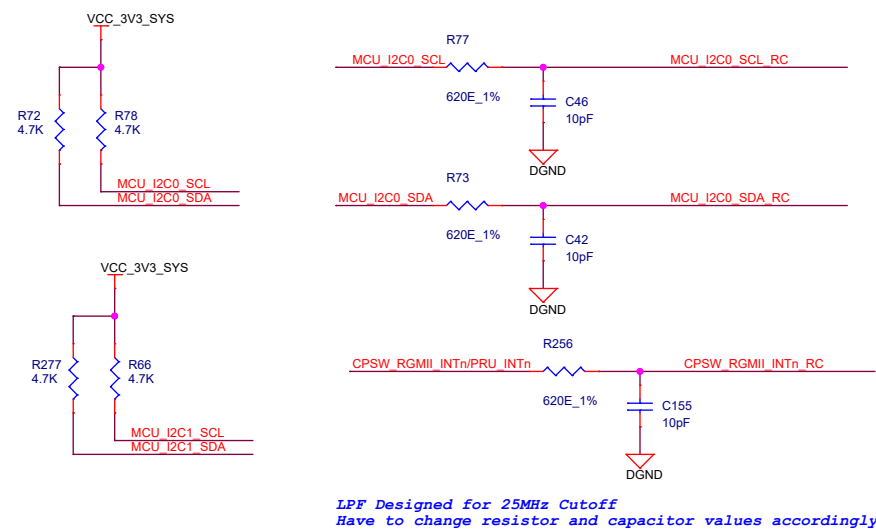
SoC_I2C1_SCL 19,31,34,36
SoC_I2C1_SDA 19,31,34,36

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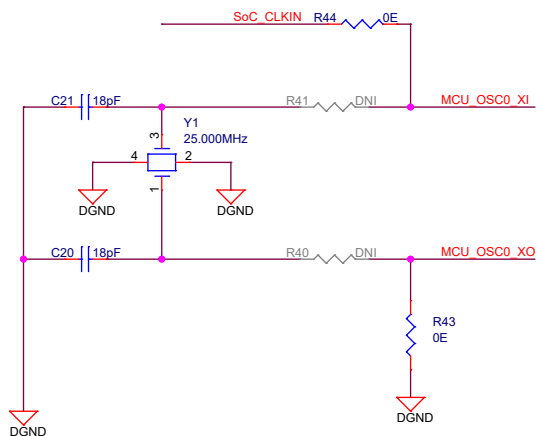
Title INDUSTRIAL COMMUNICATION LED's		
Size	PROC100 001 SKAM64	Rev
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Date:	Monday, August 22, 2022	Sheet 30 of 43

MCU_GENERAL

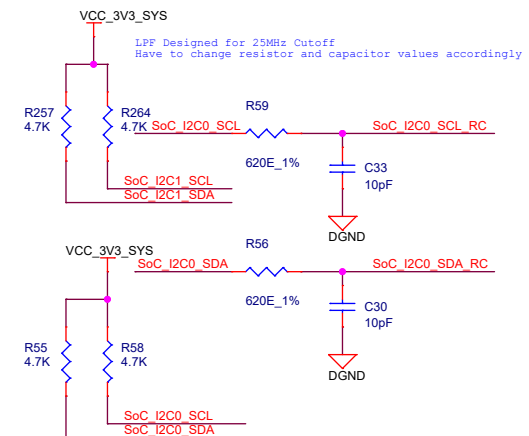
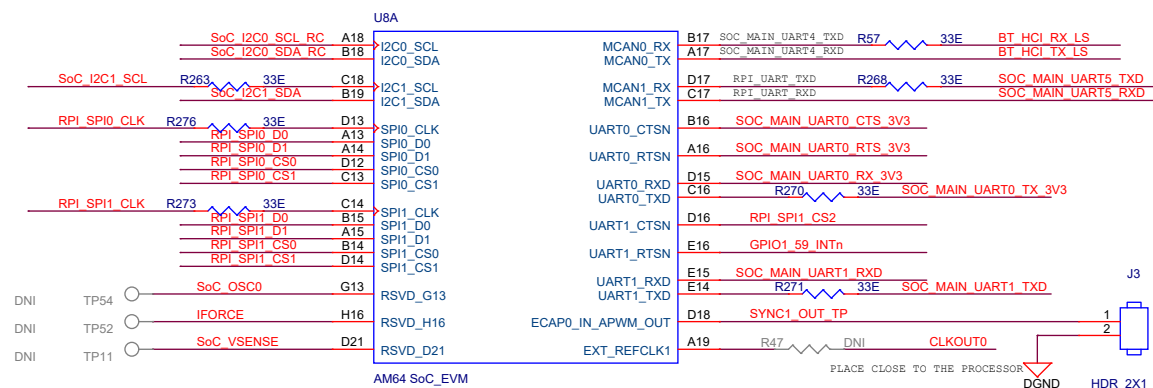


CRYSTAL

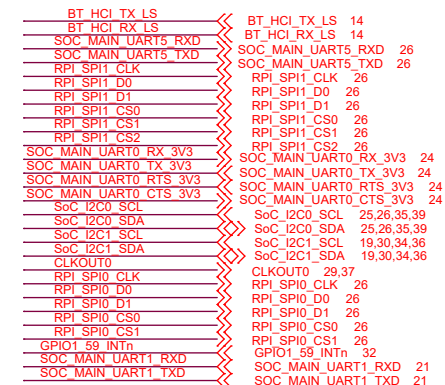
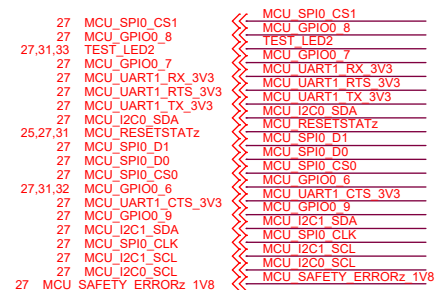
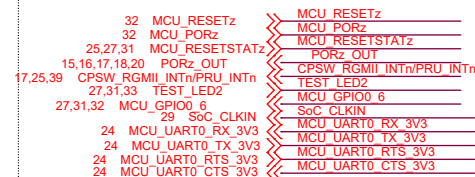
Only Footprint option to mount the Oscillator is provided.
By default the part is not mounted on the board.



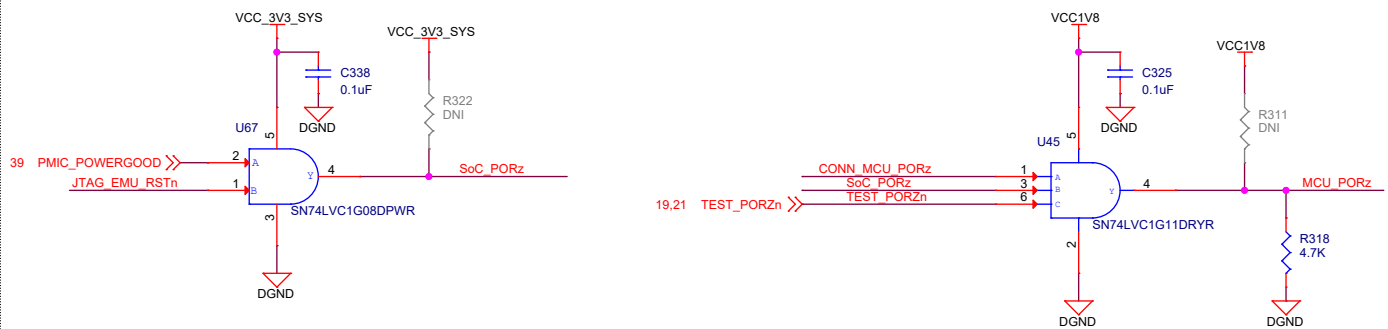
SoC MAIN DOMAIN



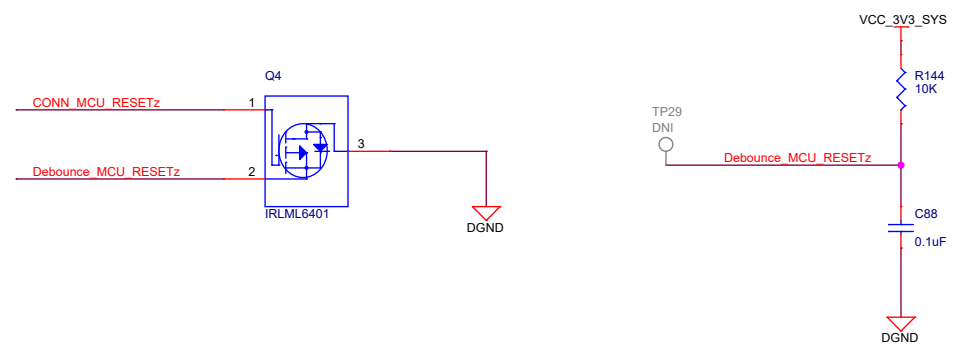
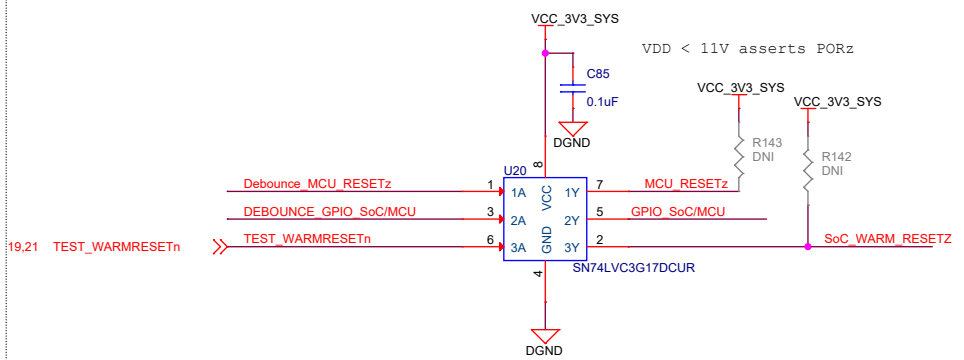
OFF PAGE CONNECTIONS



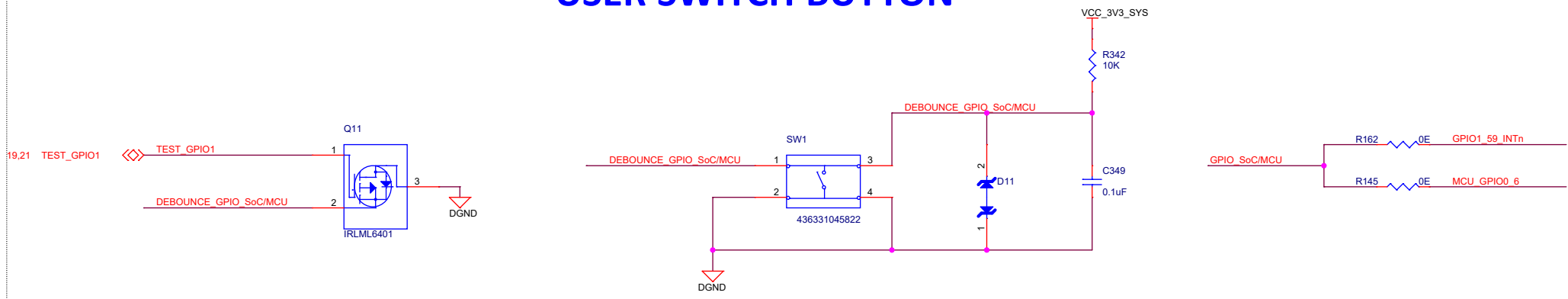
POR



DEBOUNCE CIRCUIT



USER SWITCH BUTTON



OFF PAGE CONNECTIONS

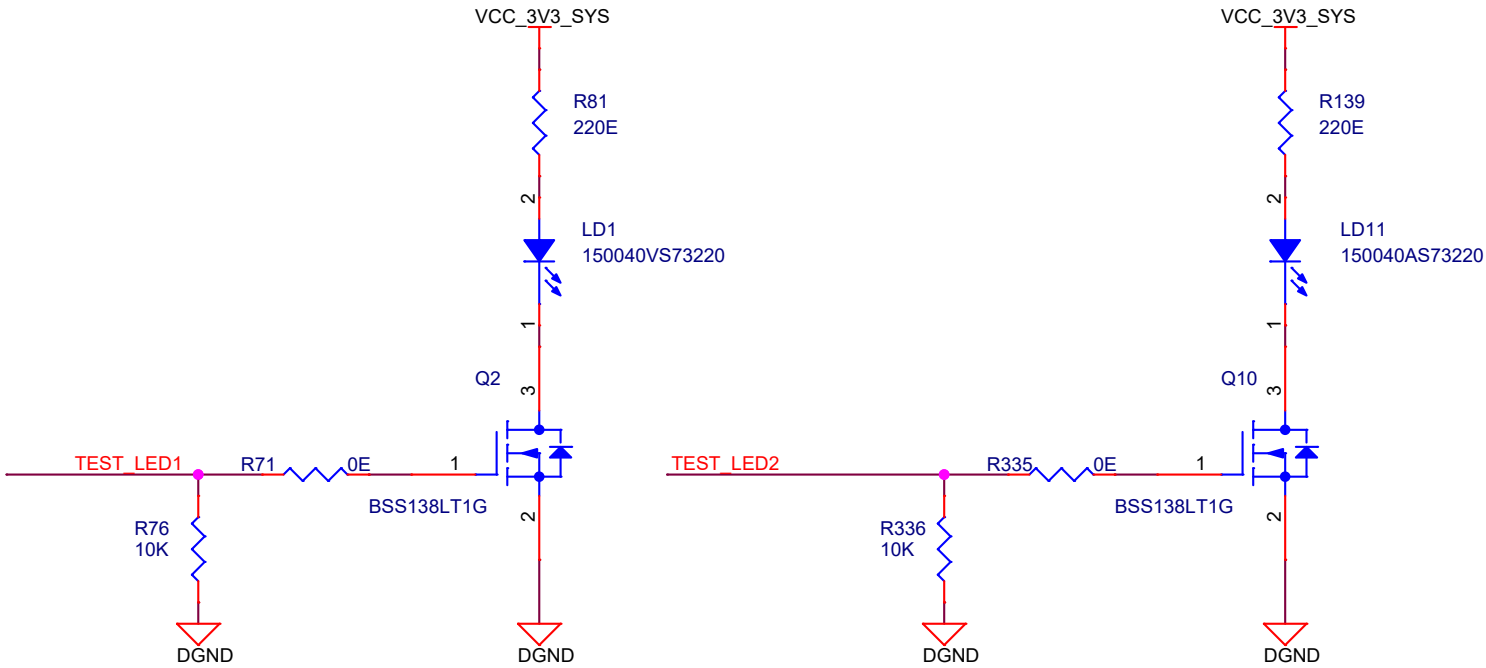
31	SoC WARM RESETz	SoC WARM RESETz
31	MCU RESETz	MCU RESETz
23	JTAG_EMU_RSTn	JTAG_EMU_RSTn
27	CONN_MCU_RESETz	CONN_MCU_RESETz
31	MCU_PORz	MCU_PORz
27,31	MCU_GPIO0_6	MCU_GPIO0_6
31	GPIO1_59_INTn	GPIO1_59_INTn
27	CONN_MCU_PORz	CONN_MCU_PORz

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Title RESET CIRCUIT		
Size	PROC100 001 SKAM64	Rev
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USER TEST LED's



OFF PAGE CONNECTIONS

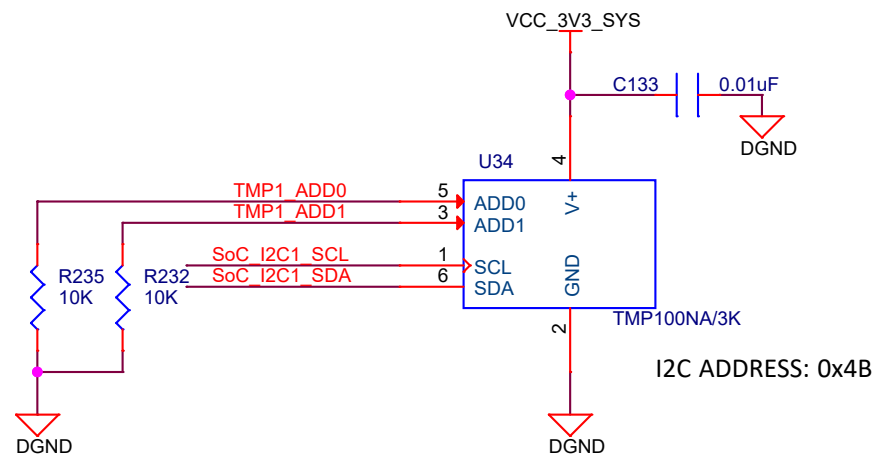


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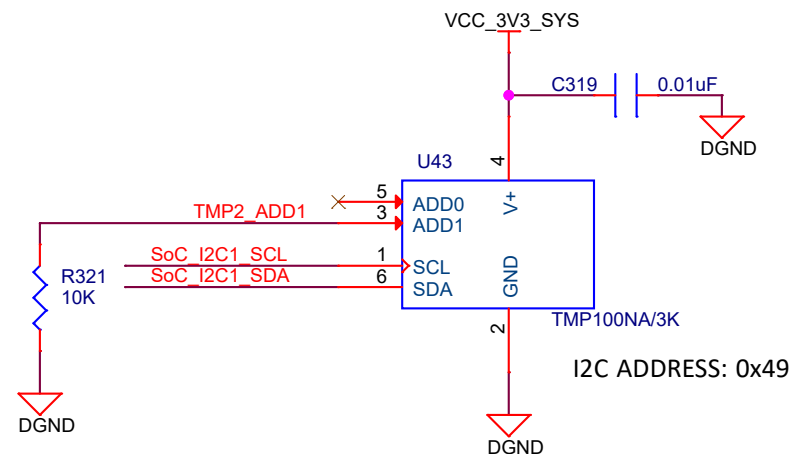


Title		USER TEST LED's	
Size	PROC100 001 SKAM64		Rev
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TEMPERATURE SENSORS



NOTE: PLACE TEMP SENSOR CLOSE TO SoC



NOTE: PLACE TEMP SENSOR CLOSE TO LPDDR4



OFF PAGE CONNECTIONS



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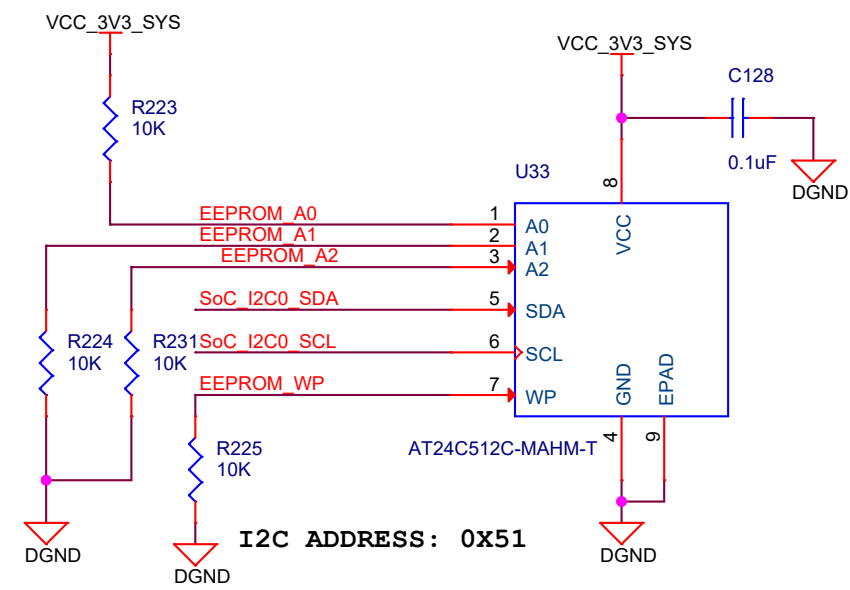
Title TEMPERATURE SENSORS

Size B
PROC100 001 SKAM64

Rev A

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BOARD ID EEPROM



OFF PAGE CONNECTIONS



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Title BOARD ID EEPROM

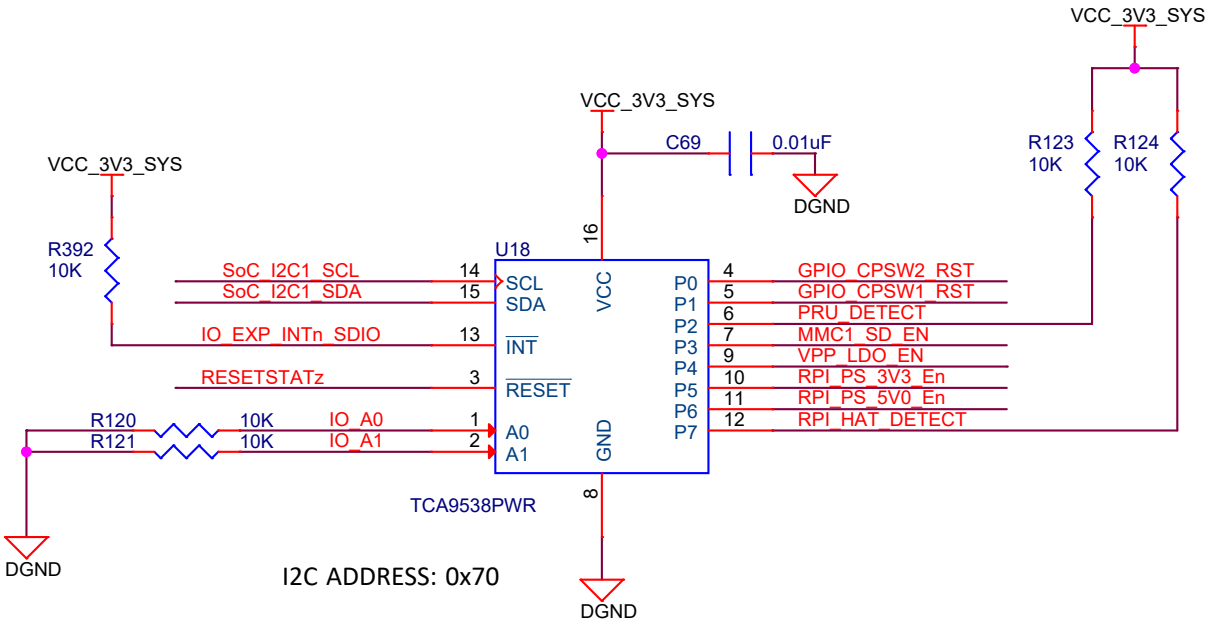
Size B
PROC100 001 SKAM64

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IO EXPANDER



I2C ADDRESS: 0x70

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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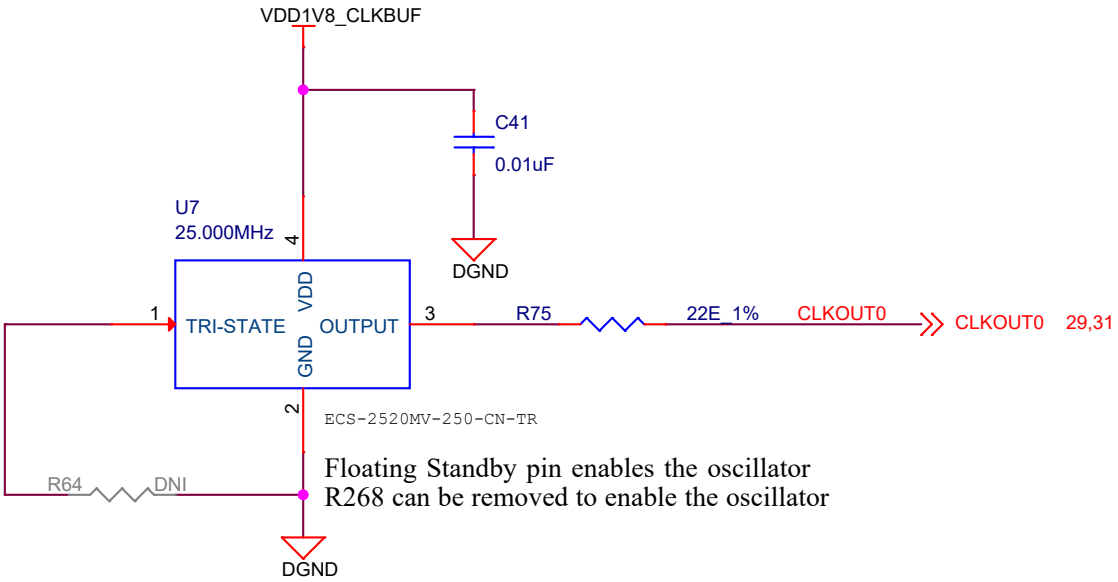
Title IO EXPANDER

Size B PROC100 001 SKAM64

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OSCILLATOR



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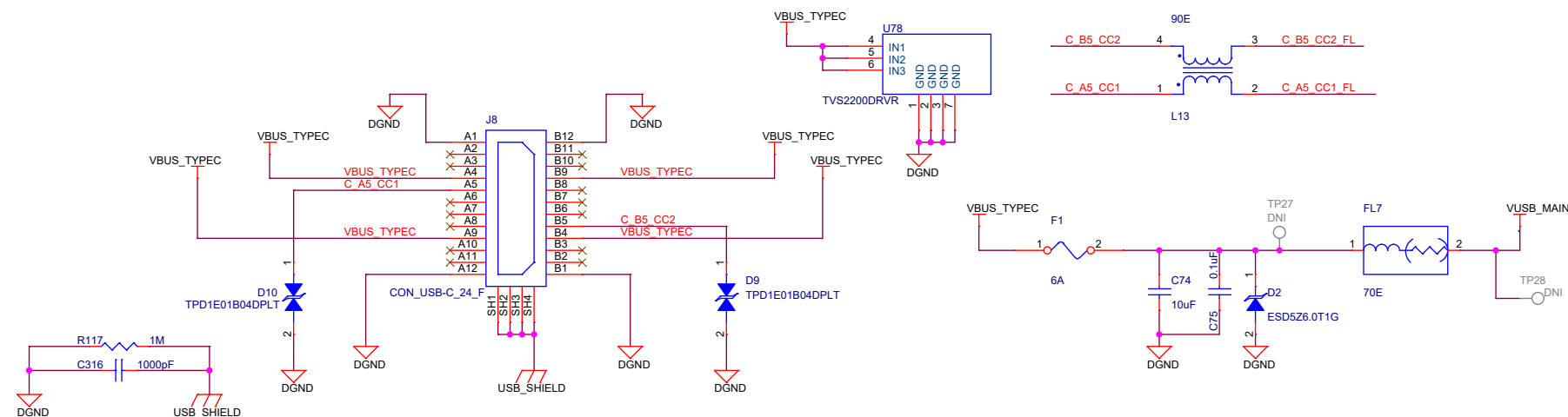


Title OSCILLATOR

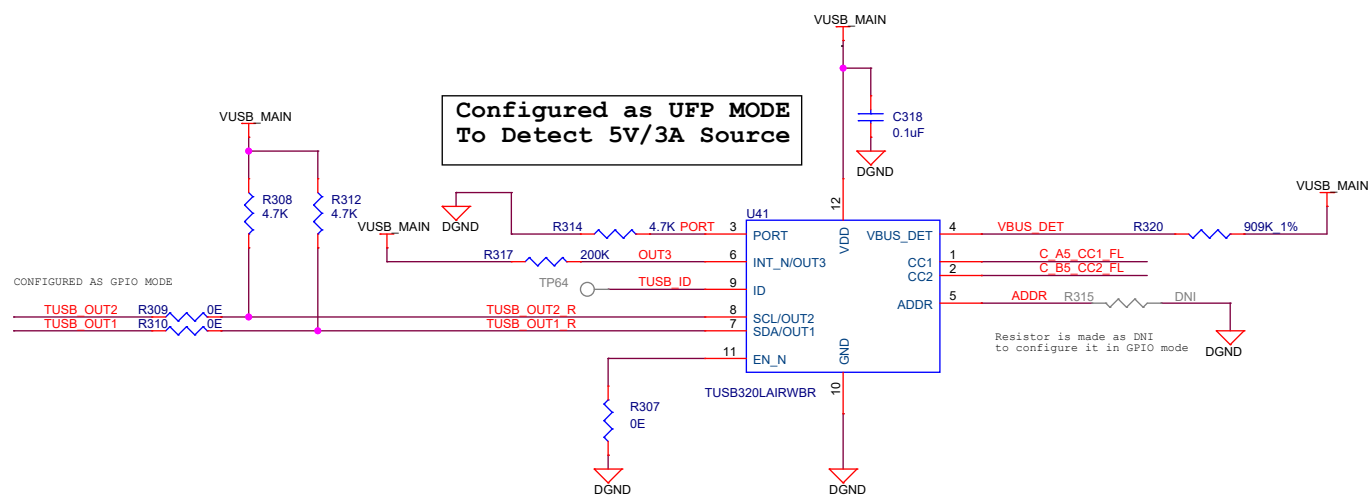
Size	PROC100 001 SKAM64	Rev
B		A

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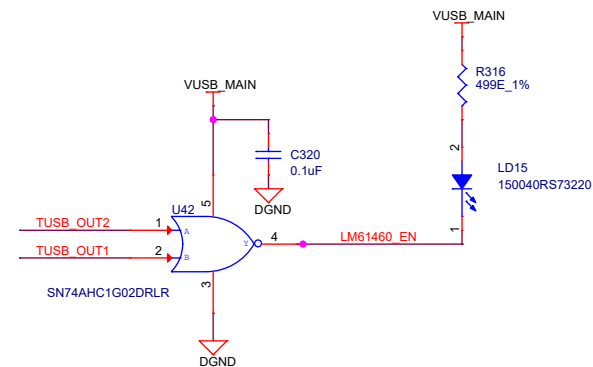
USB TYPE-C CONNECTOR



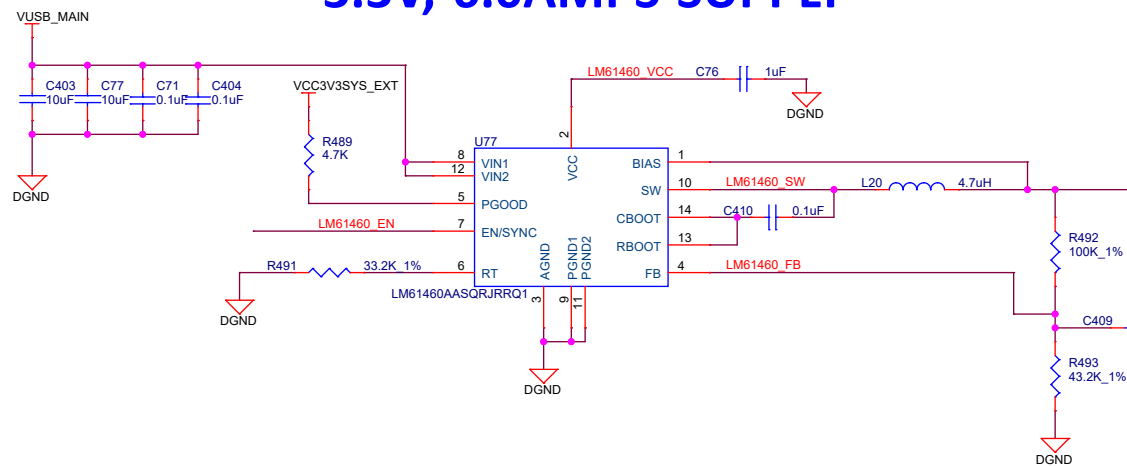
USB TYPE C CONFIGURATION CHANNEL LOGIC AND PORT CONTROLLER



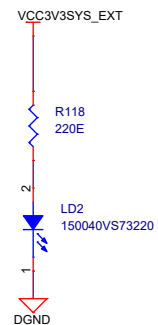
Enable Logic for 3V3 Regulator



3.3V, 6.0AMPS SUPPLY



POWER INDICATION LED



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Title USB MAIN 5V POWER SUPPLY

Size PROC100 001 SKAM64

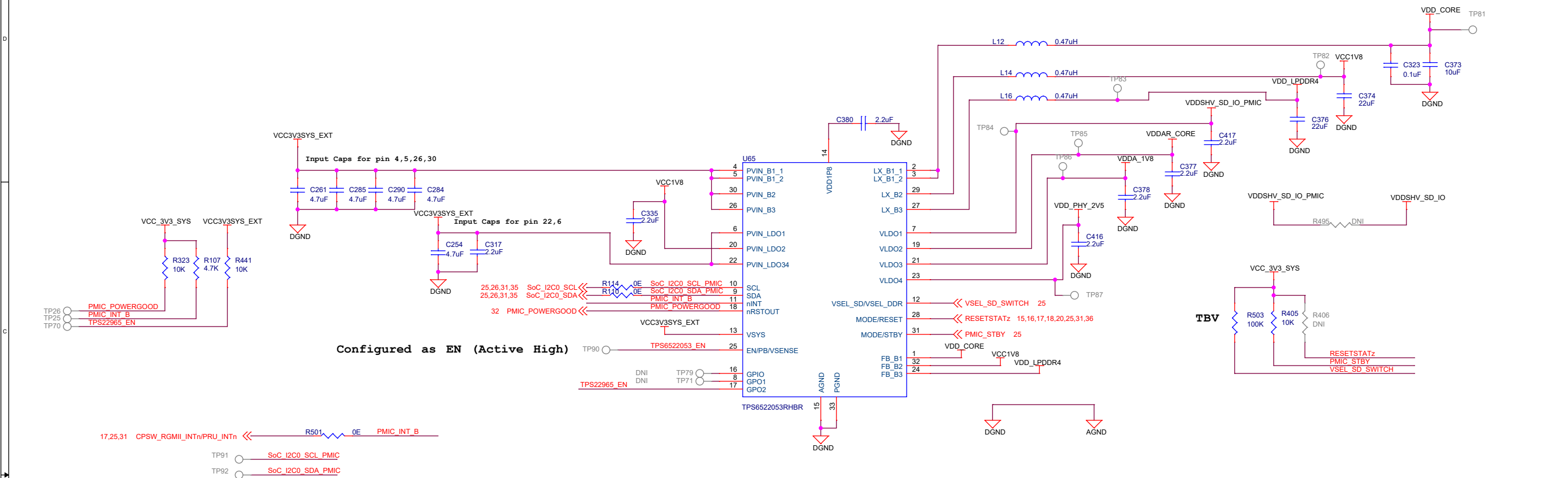
C

Date: Monday, August 22, 2022

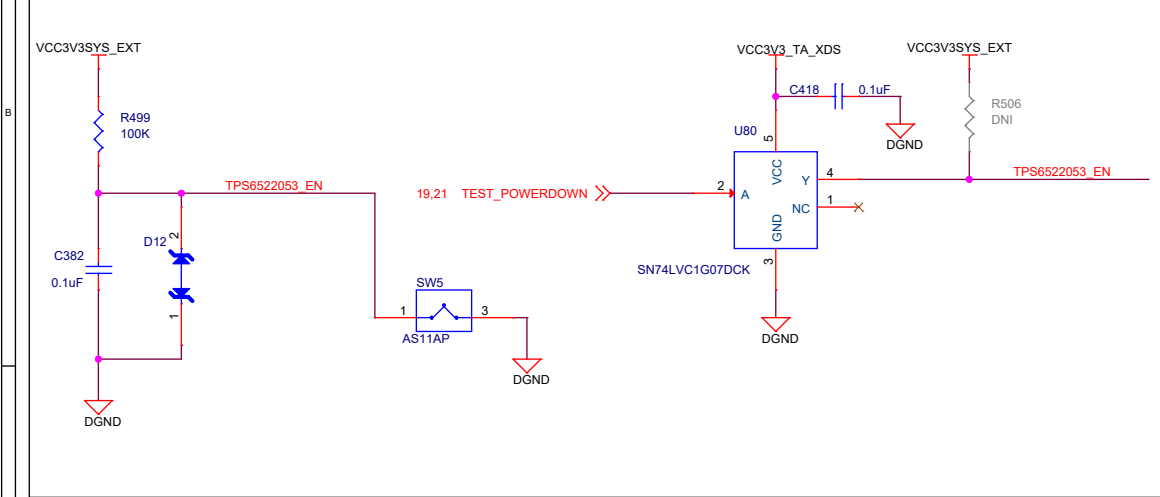
Rev A

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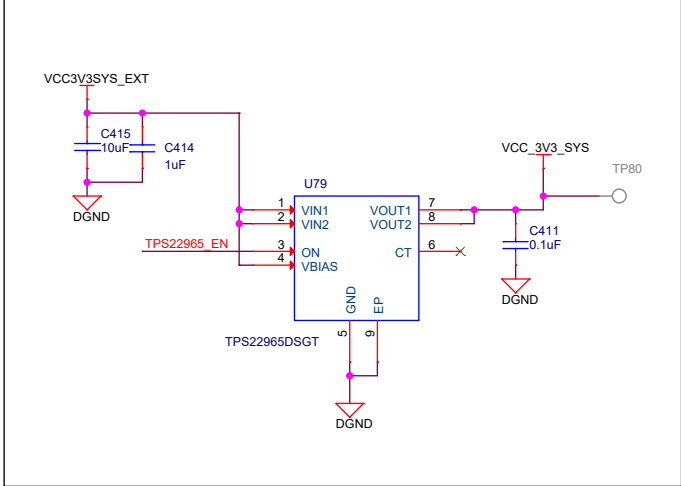
TPS6522053 PMIC



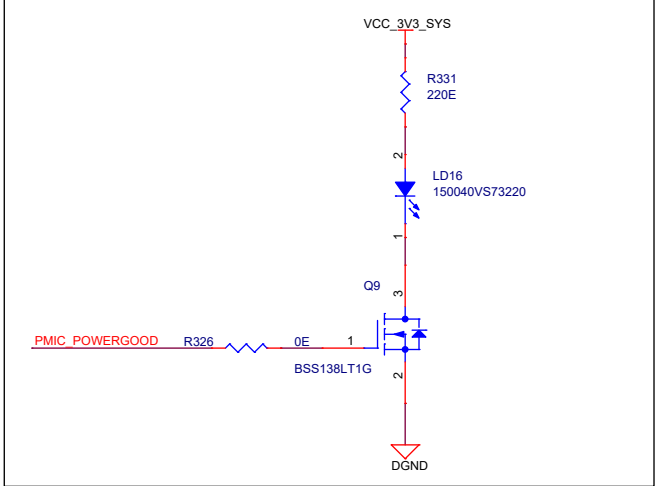
ON/OFF LOGIC



3V3 POWER SWITCH



POWER INDICATION LED



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Title TPS6522053RHBR PMIC

Size PROC100 001 SKAM64

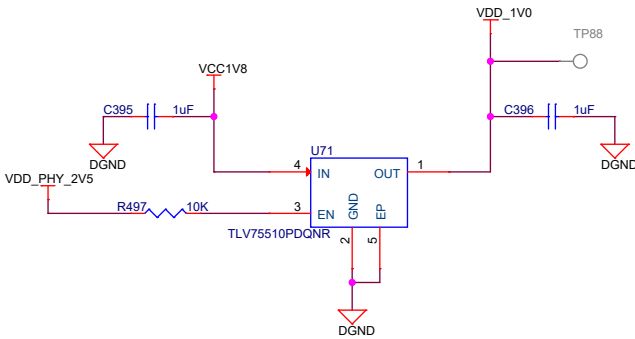
Date: Monday, August 22, 2022

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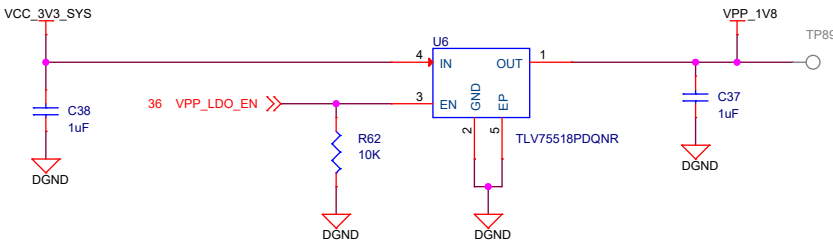
Rev

A

1.0V, 500mA SUPPLY



eFUSE PROGRAMMING VOLTAGE TO SoC



1.8V VPP, 0.15AMPS SUPPLY

STRAP CONFIGURATION OF ETHERNET PHYS

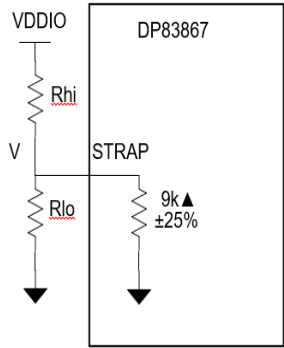


Figure 25. Strap Circuit

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

Designed for TI by Mistral Solutions Pvt Ltd		TitleSTRAP CONFIGURATION OF ETHERNET PHYS	
 	SizeD	PROC100 001 SKAM64	RevA
		Date: Monday, August 22, 2022	Sheet 41 of 43

HARDWARE SCHEMATICS

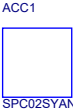
ASSEMBLY NOTES

- 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.

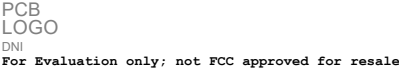
BARE PCB



JUMPERS



LOGOs



FIDUCIALS



LABELS

Board Serial No.



Assembly Revision



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Title HARDWARE SCHEMATICS

Size C PROC100 001 SKAM64

Rev A

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