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Changes:

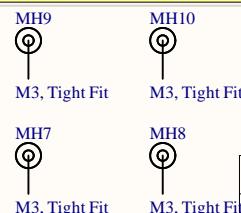
- 05:
* Fix ethernet termination
- 06:
* Add option for RGBLED pull direction
* Add I2C pull-ups on R-Pi Header
- 07:
* Add RGBLED0 driven by RP2040 option
- 08:
* Minor PCB silkscreen changes, production version
- 09:
* PUDC has pull-up resistor
* Input protection is PMOS
* Remove D1/D2

Known Issues:

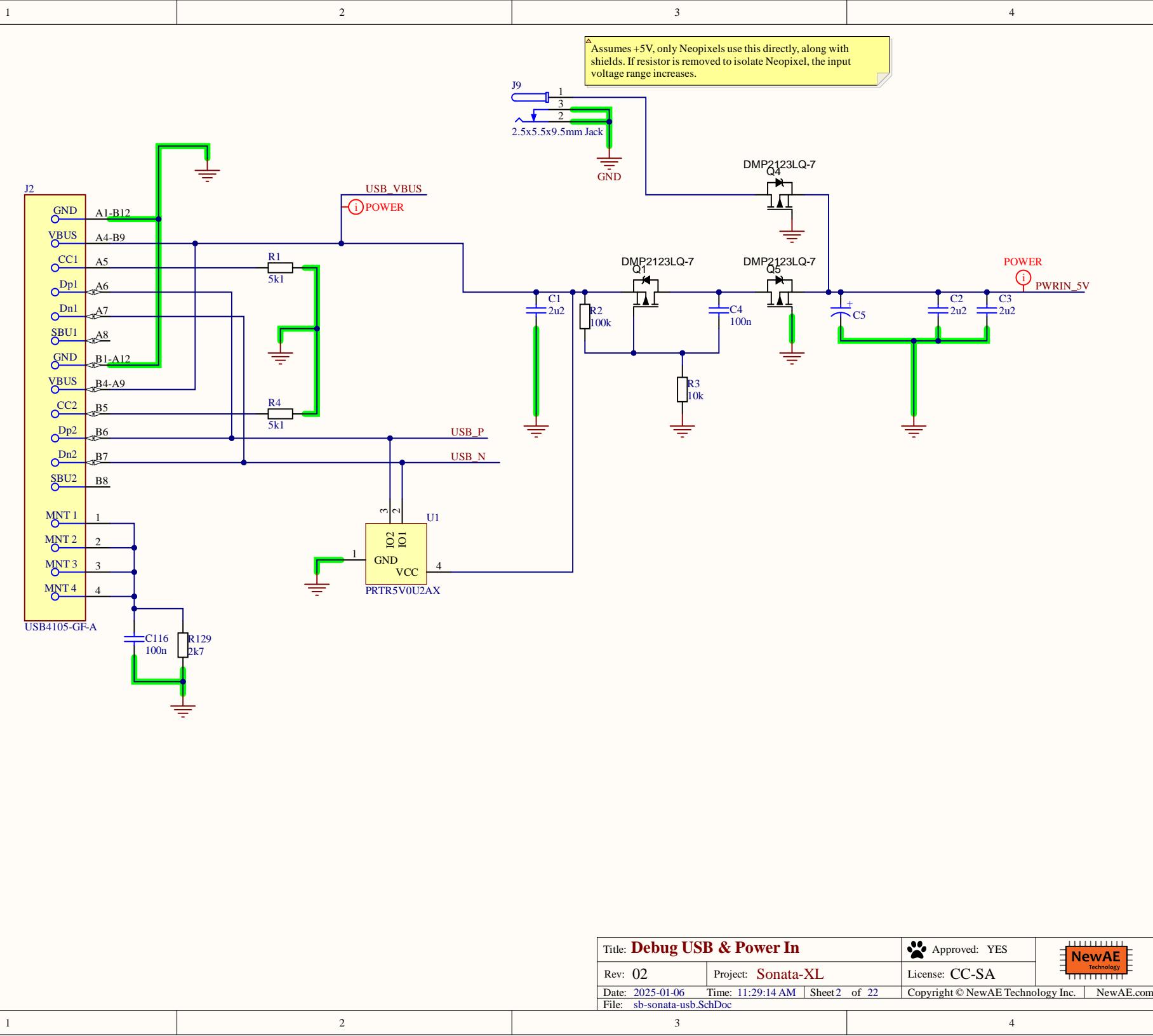
- * See issues on <https://github.com/newaetech/sonata-pcb> for tracking

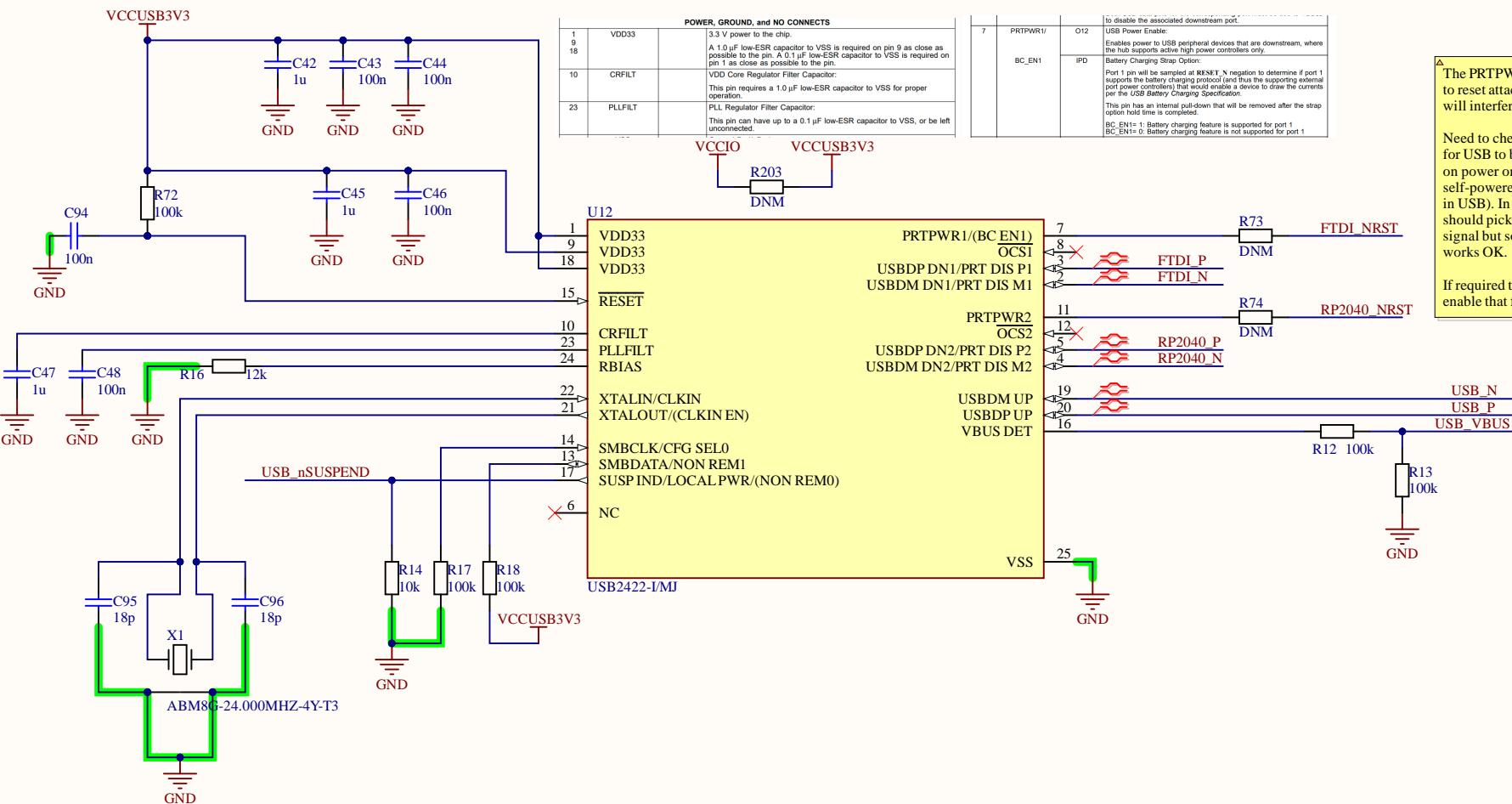
-08:

- *RGB leds are always powered on, which can have random or old data loaded.



Title: Mechanical & Title Page		Approved: YES	
Rev: 02	Project: Sonata-XL	License: CC-SA	
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File: sb-sonata-mech.SchDoc			





The PRTPWR pins could be used to reset attached devices. But that will interfere with standalon usage.

Need to check if reset is required for USB to be picked up depending on power order (e.g. if board is self-powered, then someone plugs in USB). In theory attached devices should pick up the USB suspend signal but something to confirm works OK.

If required the series resistors will enable that for now.

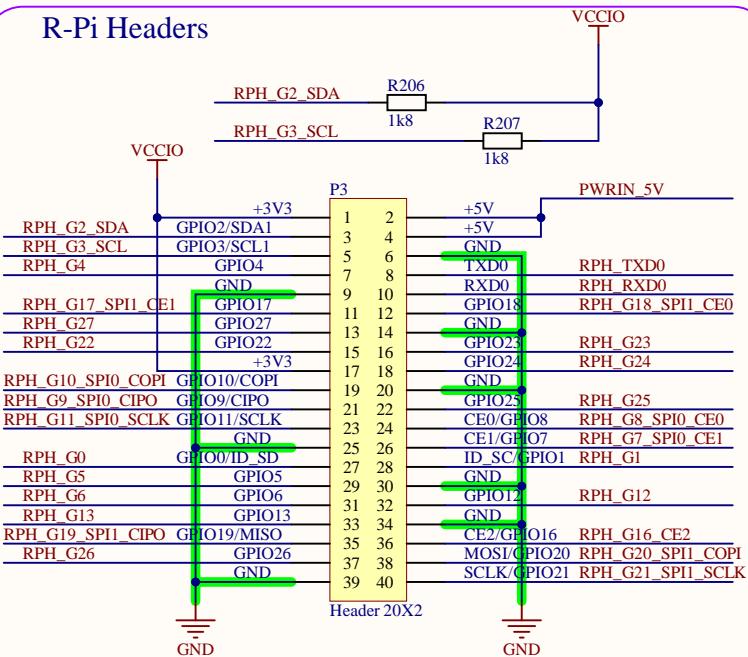
TABLE 4-1: HUB CONFIGURATION OPTIONS

CFG_SEL	Description
0	Default configuration: • Strap options enabled • Hub descriptors indicate the hub as "self-powered"
1	The hub is configured externally over SMBus (as an SMBus slave device with address 0101100b); • Strap options disabled • Self-powered or bus-powered depending on register settings • All registers configured over SMBus

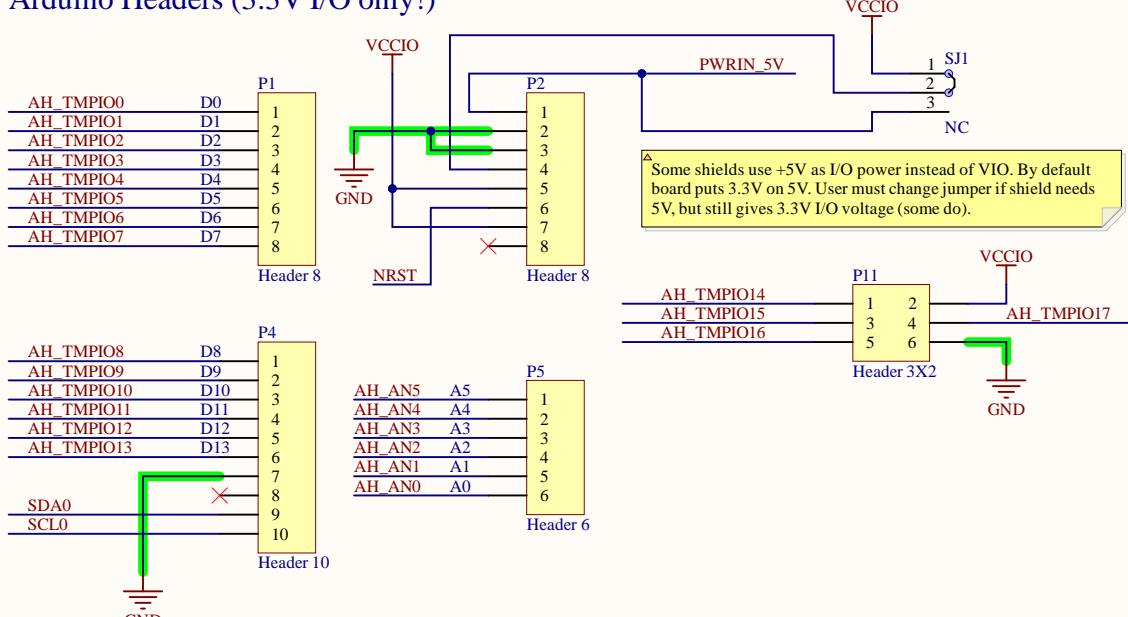
Strap config, non-removable ports.

NON_Rem[1:0] = 00: all ports are removable
NON_Rem[1:0] = 01: port 1 is non-removable
NON_Rem[1:0] = 10: ports 1 and 2 are non-removable
NON_Rem[1:0] = 11: reserved

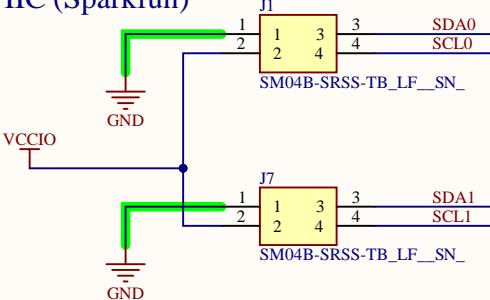
R-Pi Headers



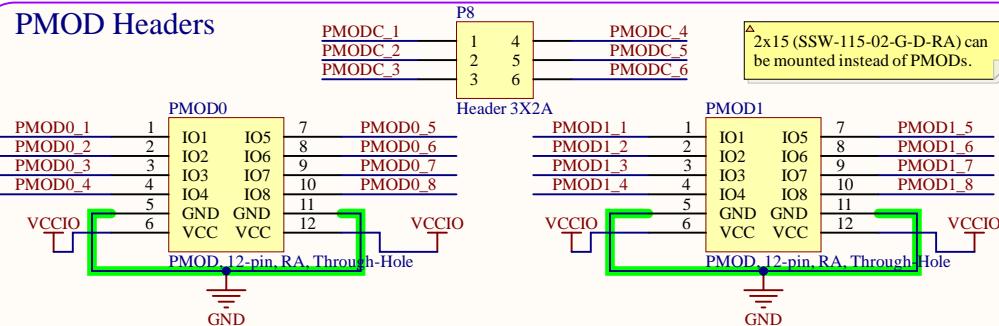
Arduino Headers (3.3V I/O only!)



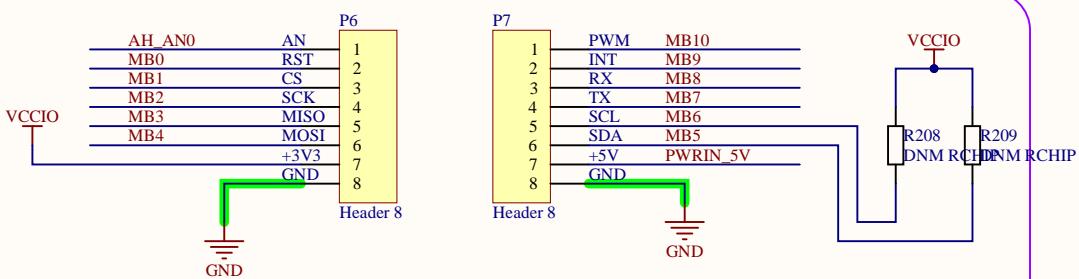
QWIIC (Sparkfun)



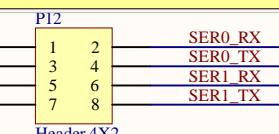
PMOD Headers



mikroBUS Click



Jumpers serial to FTDI, or use to breakout extra serial.



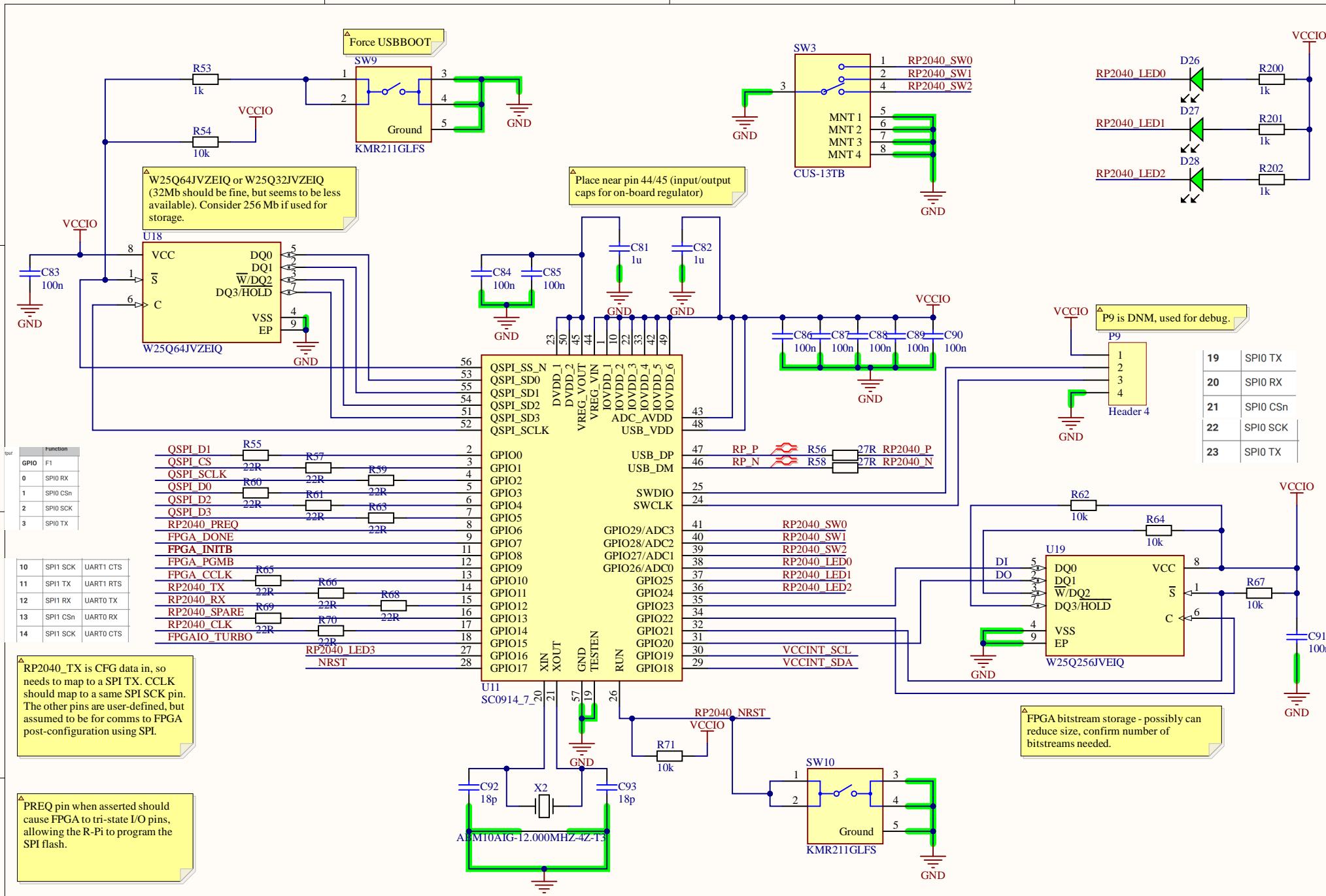
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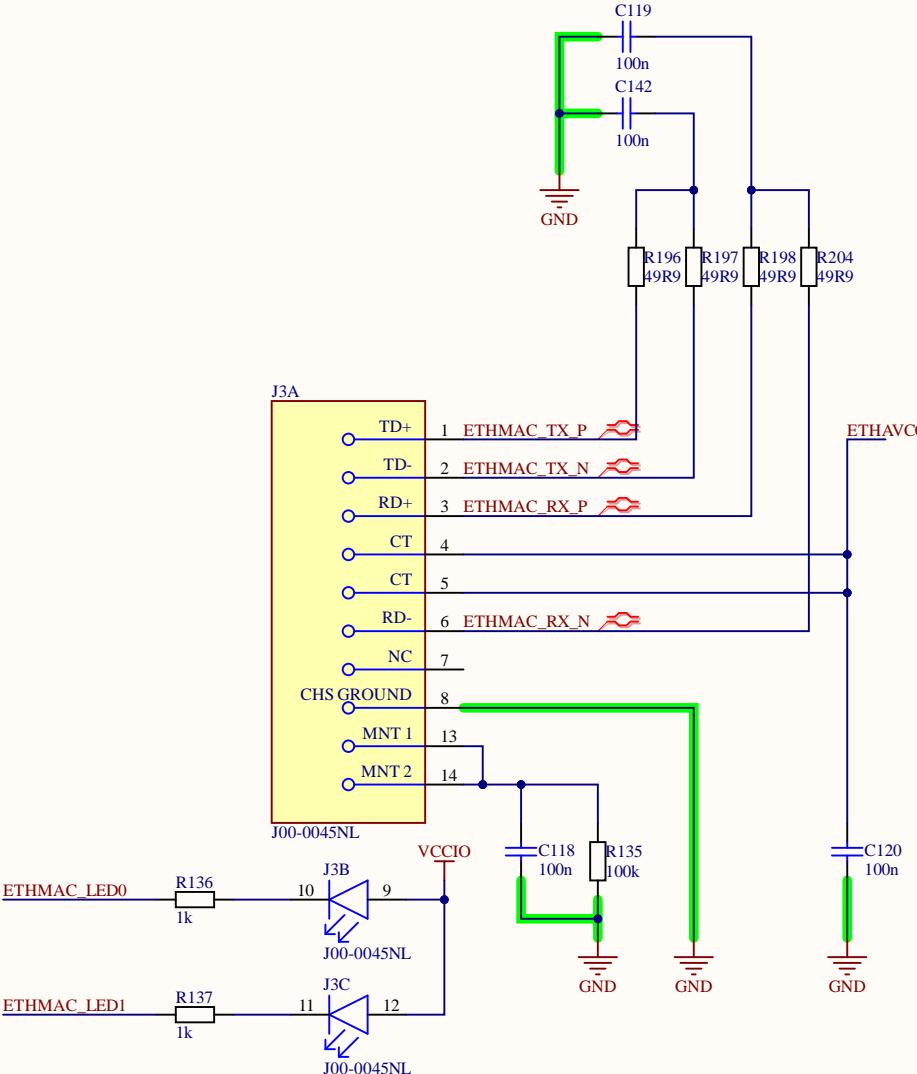
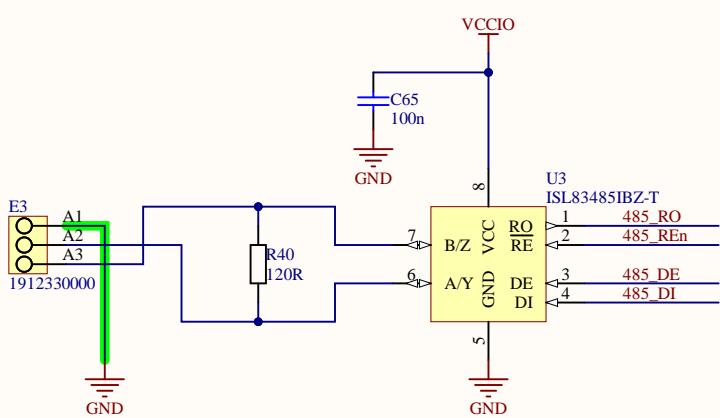
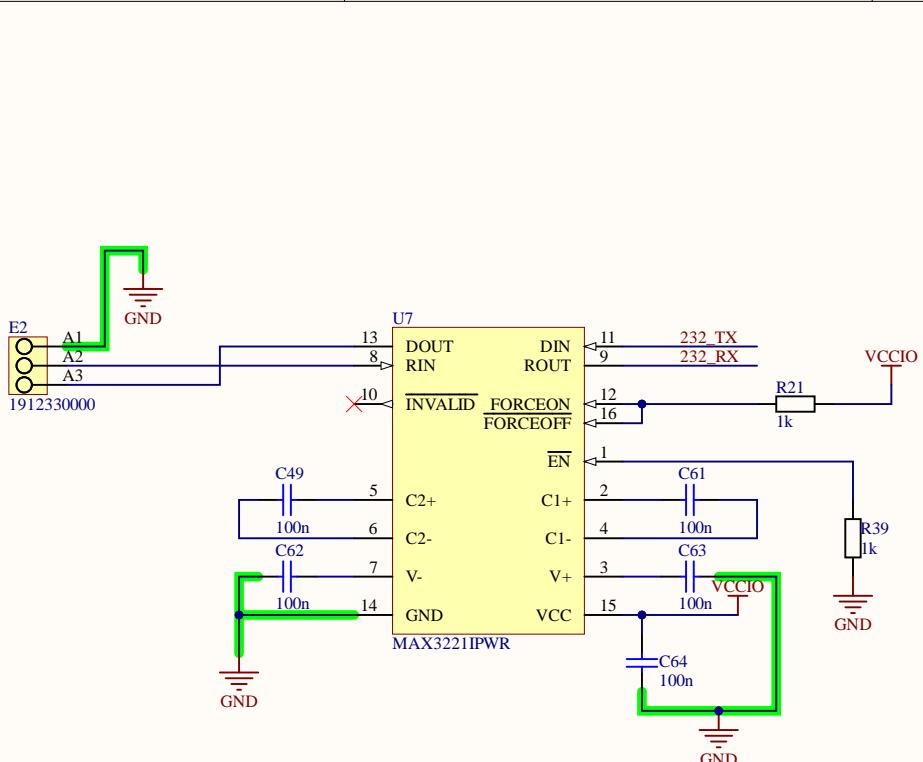
Rev: 02 Project: **Sonata-XL**

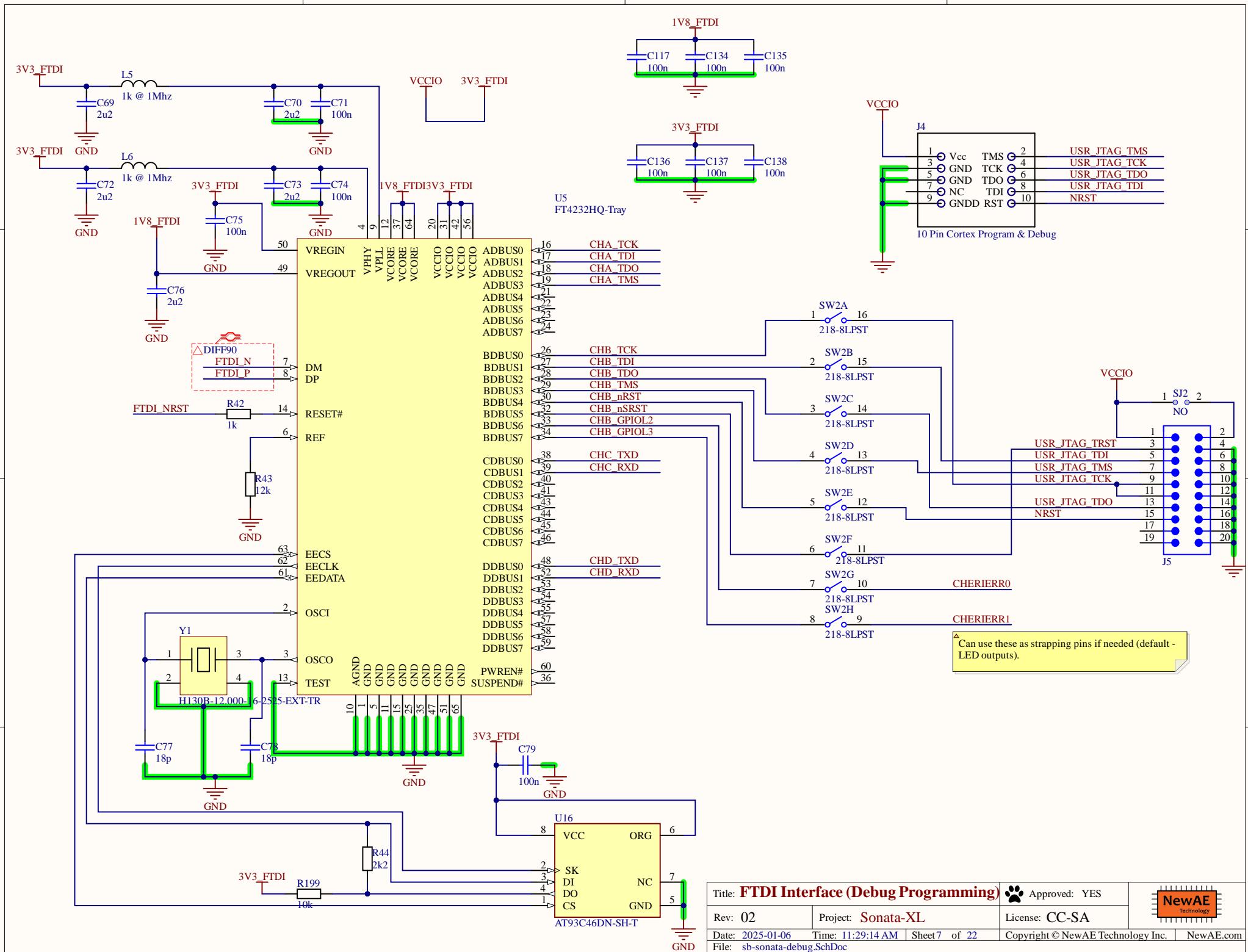
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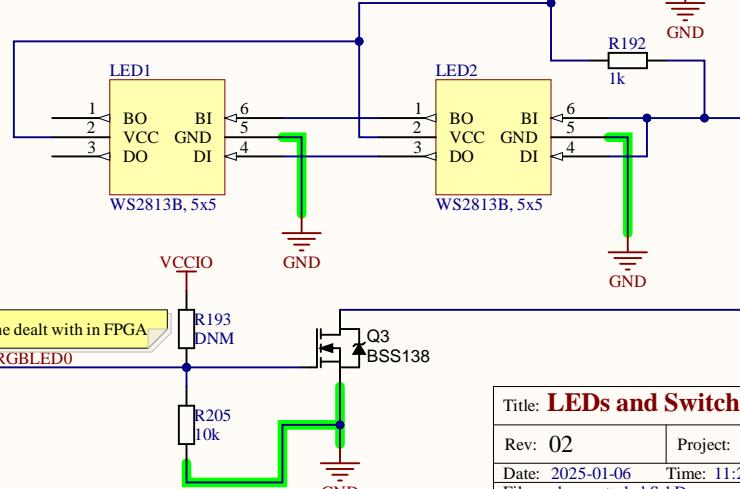
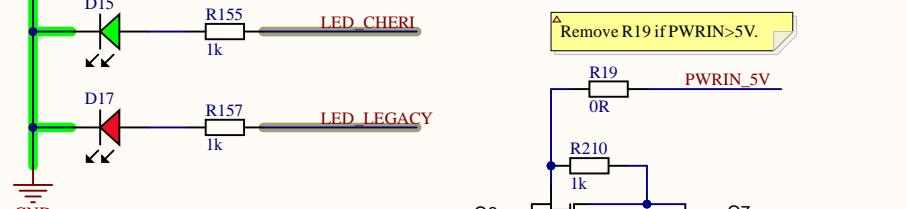
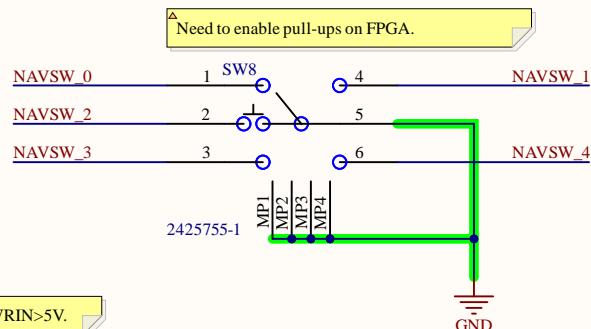
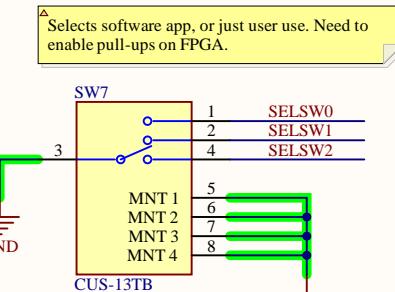
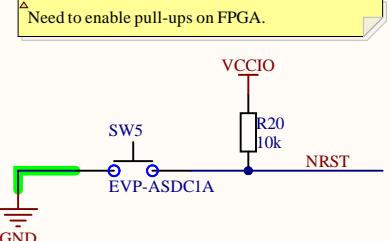
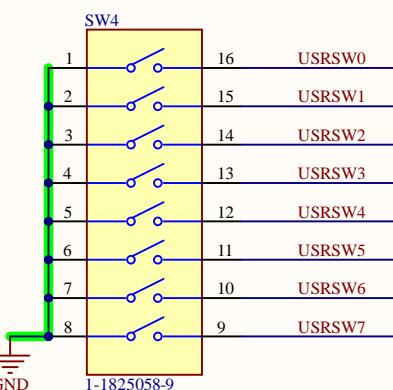
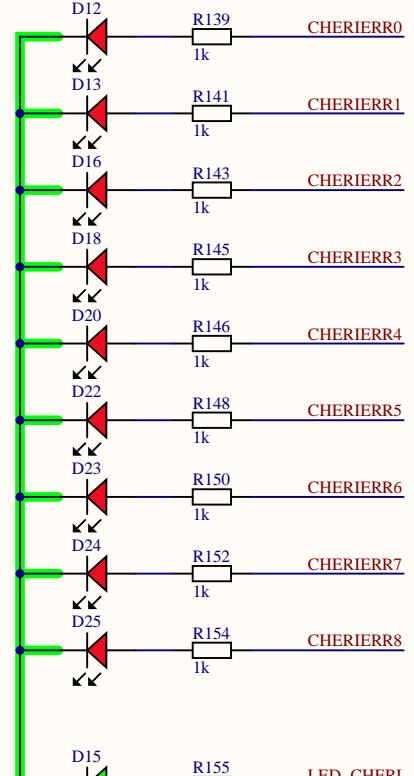
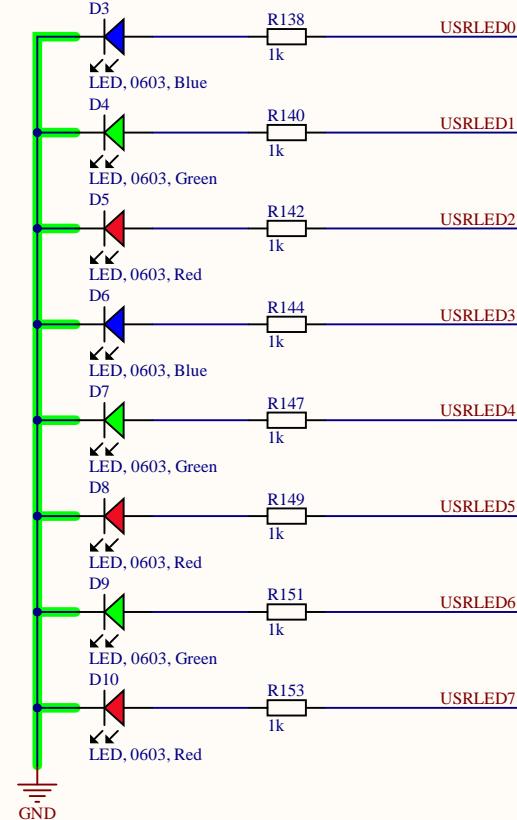
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Title: LEDs and Switches

Rev: 02 Project: Sonata-XL

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File: sb-sonata-led.SchDoc

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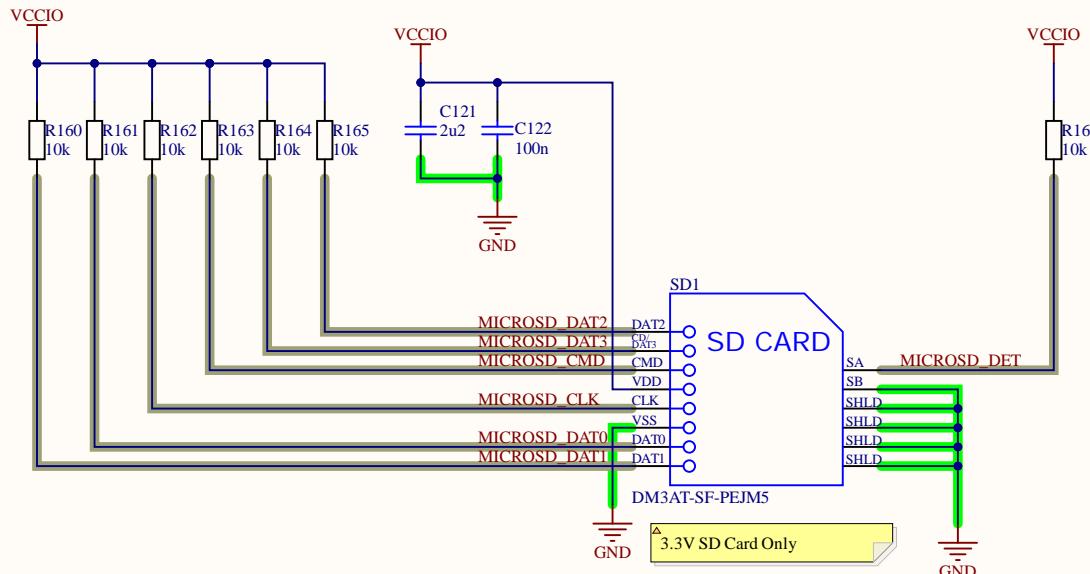
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Title: MicroSD Card Connector

Rev: 02

Project: Sonata-XL

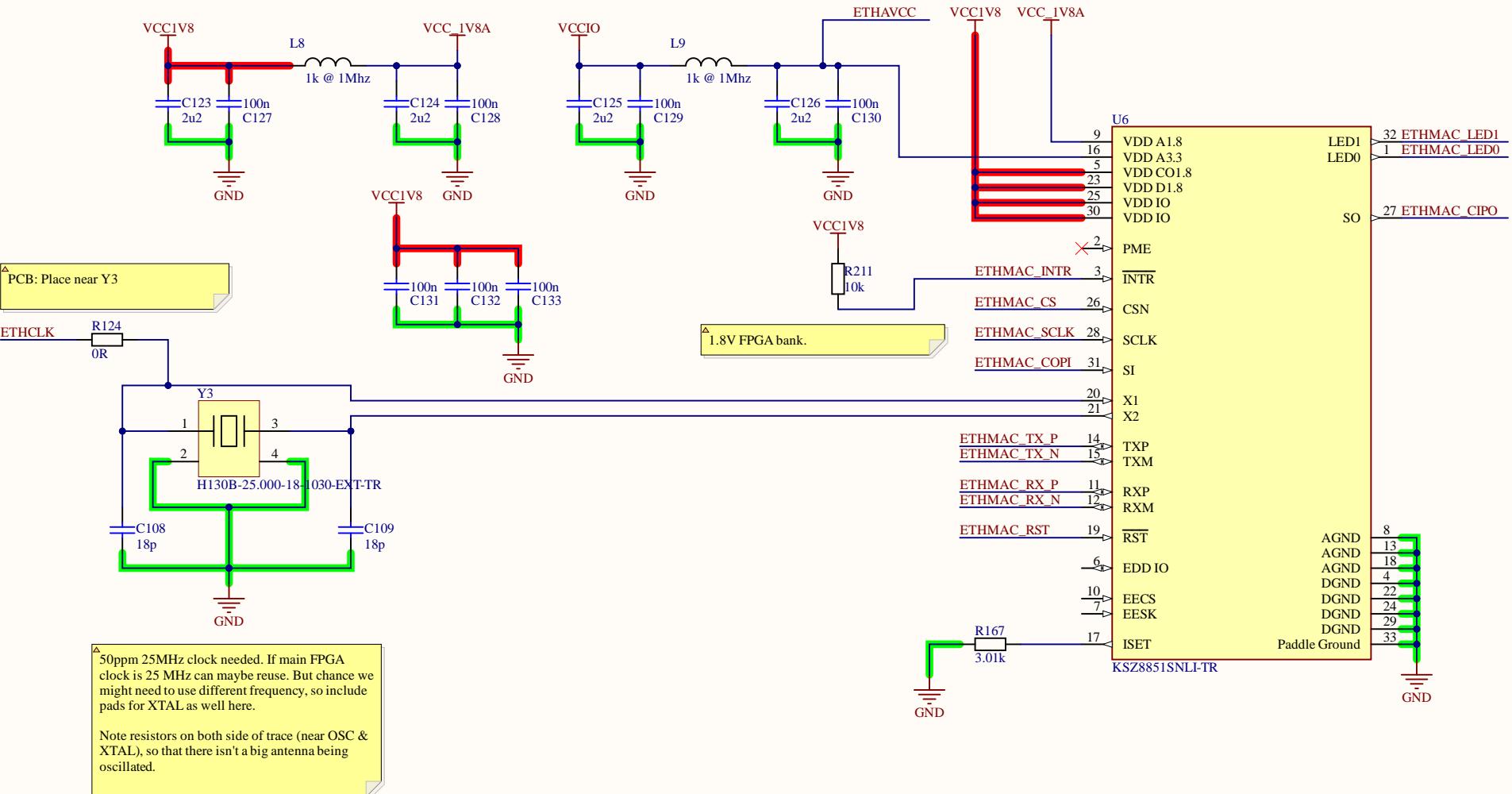
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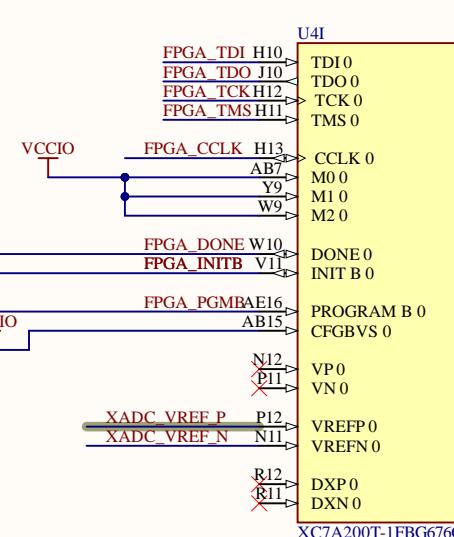
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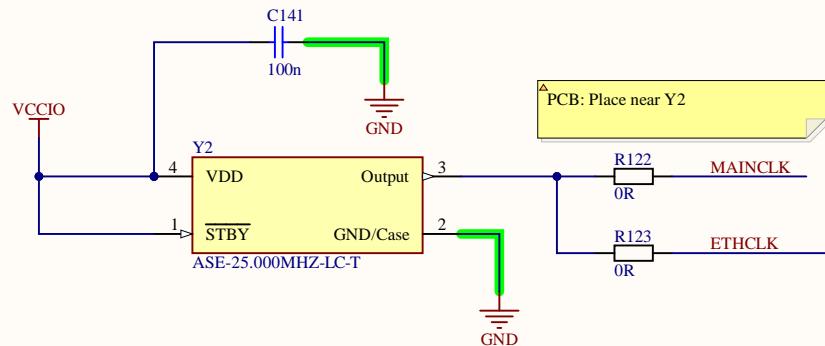
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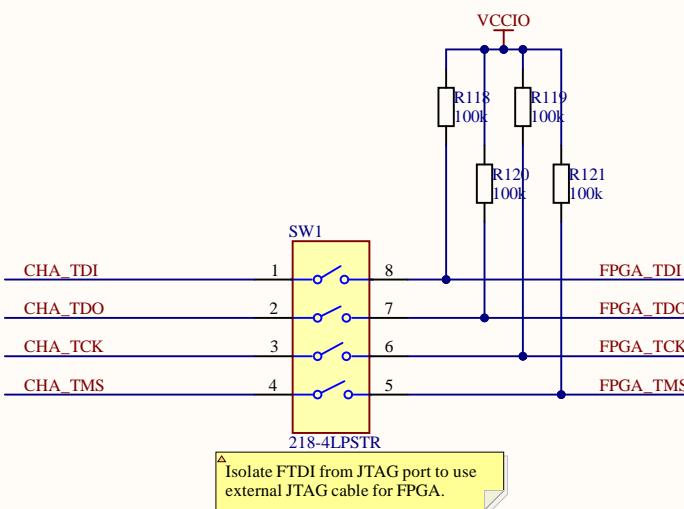
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Title: FPGA Config & Misc

Rev: 02 Project: Sonata-XL

Date: 2025-01-06 Time: 11:29:14 AM Sheet 11 of 22

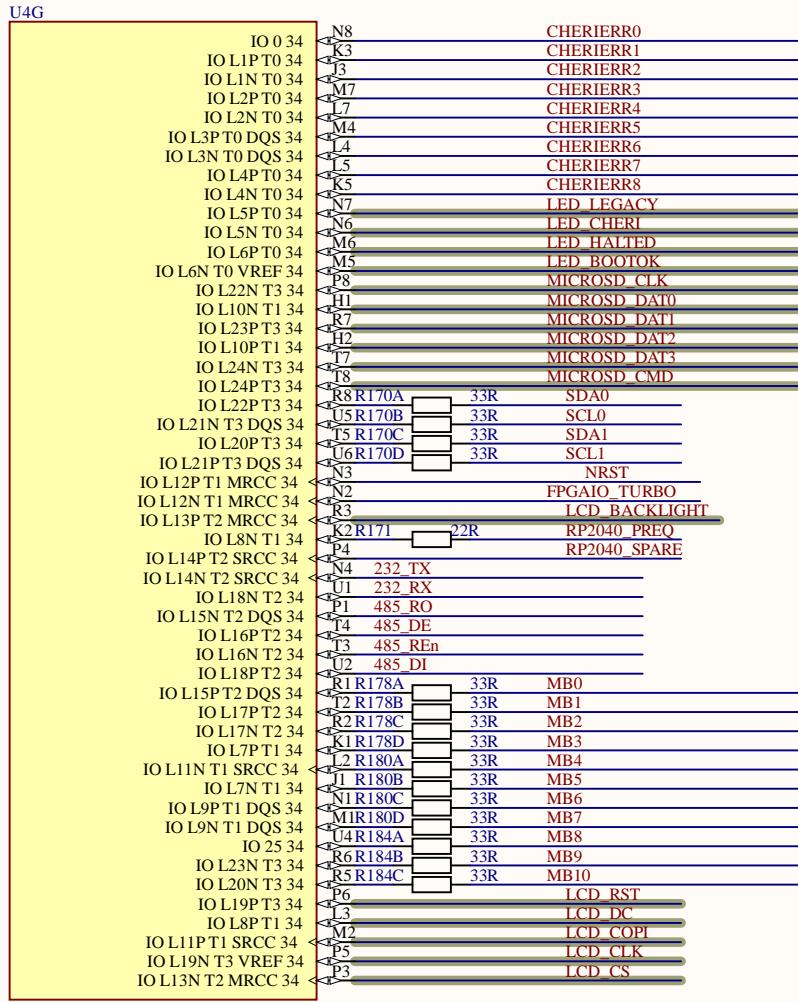
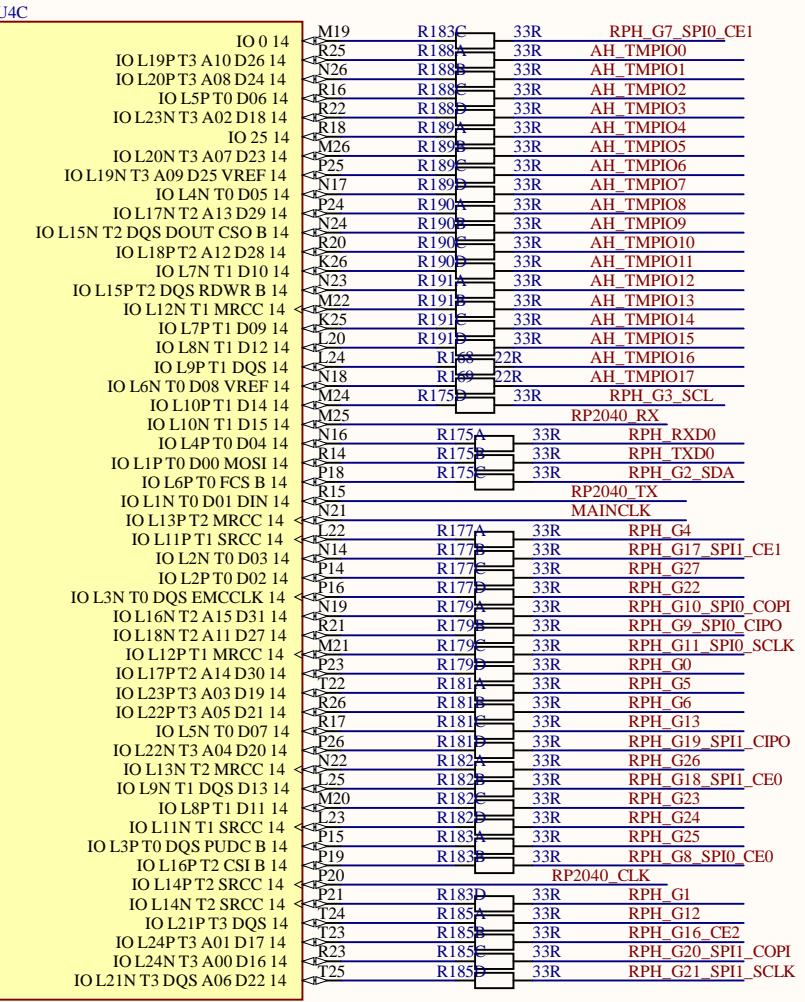
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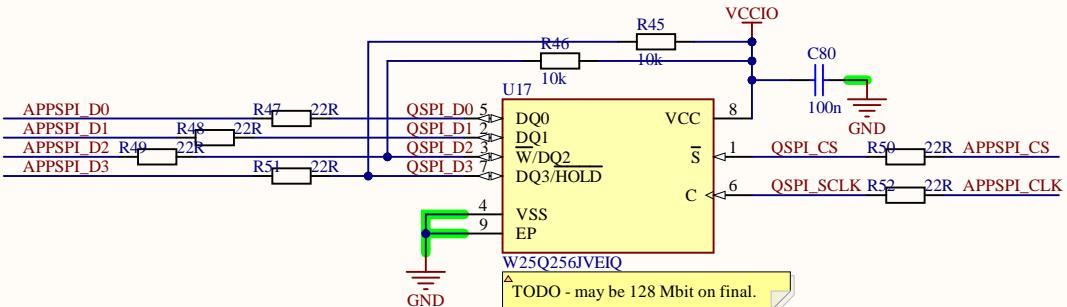


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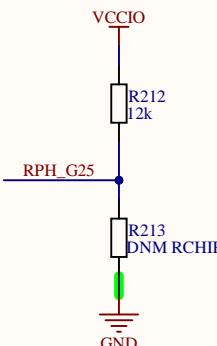


XC7A200T-1FBG676C



⚠ This SPI flash can be driven from both the FPGA and from the RP2040. Ideally placed between them with a sort of daisy-chain style routing FPGA->SPI->RP2040, as short as possible.

△ TODO - may be 128 Mbit on final.



Title: IO Banks 14+34 + Flash		 Approved: YES	
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U4D

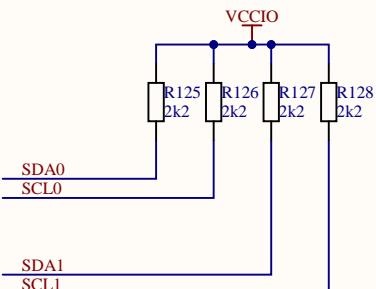
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IO L1 P T0 AD0P 15	K15_ANALOG1_DIGITAL
IO L1N T0 AD0N 15	J16_ANALOG2_DIGITAL
IO L2P T0 AD8P 15	J14 USRLED0
IO L2N T0 AD8N 15	J15 USRLED1
IO L3P T0 DQS AD1P 15	K16 USRLED2
IO L3N T0 DQS AD1N 15	K17 USRLED3
IO L4P T0 15	M14 USRLED4
IO L4N T0 15	L14 USRLED5
IO L5P T0 AD9P 15	M15 USRLED6
IO L5N T0 AD9N 15	J15 USRLED7
IO L6P T0 15	M16 USRSW0
IO L6N TO VREF 15	M17 USRSW1
IO L7P T1 AD2P 15	J19 USRSW2
IO L7N T1 AD2N 15	H19 USRSW3
IO L8P T1 AD10P 15	L17 USRSW4
IO L8N T1 AD10N 15	J18 USRSW5
IO L9P T1 DQS AD3P 15	K20 USRSW6
IO L9N T1 DQS AD3N 15	J20 USRSW7
IO L10P T1 AD11P 15	J18R172A 33R PMOD1_1
IO L10N T1 AD11N 15	H18R172B 33R PMOD1_2
IO L11P T1 SRCC 15	G20R172C 33R PMOD1_3
IO L11N T1 SRCC 15	G21 USR_JTAG_TCK
IO L12P T1 MRCC 15	K2R173A 33R PMOD1_5
IO L12N T1 MRCC 15	J2R173B 33R PMOD1_6
IO L13P T2 MRCC 15	H2R173C 33R PMOD1_7
IO L13N T2 MRCC 15	J2R173D 33R PMOD1_8
IO L15P T2 DQS 15	G2R174A 33R PMOD0_1
IO L14N T2 SRCC 15	H2R174B 33R PMOD0_2
IO L14P T2 SRCC 15	J23R174C 33R PMOD0_3
IO L15N T2 DQS ADV B 15	F2R174D 33R PMOD0_4
IO L17N T2 A25 15	E2R176A 33R PMOD0_5
IO L16N T2 A27 15	H2R176B 33R PMOD0_6
IO L16P T2 A28 15	J24R176C 33R PMOD0_7
IO L17P T2 A26 15	F2R176D 33R PMOD0_8
IO L18P T2 A24 15	K2R177D 33R PMOD1_4
IO L18N T2 A23 15	K23 USR_JTAG_TDI
IO L19P T3 A21 VREF 15	G24 USR_JTAG_TDO
IO L19N T3 A21 VREF 15	J24 USR_JTAG_TMS
IO L19P T3 A20 15	E25 USR_JTAG_TRST
IO L20P T3 A20 15	D25 SER0_TX
IO L20N T3 A19 15	E26 SER1_TX
IO L21P T3 DQS 15	D26 SER0_RX
IO L21N T3 DQS A18 15	H26 SER1_RX
IO L22P T3 A17 15	F2R194A 33R PMODC_4
IO L23N T3 FWE B 15	G2R194B 33R PMODC_5
IO L22N T3 A16 15	H2R194C 33R PMODC_6
IO L23P T3 FOE B 15	J25R194D 33R PMODC_1
IO L24P T3 RS1 15	R686 22R PMODC_2
IO L24N T3 RS0 15	R687 22R PMODC_3
IO 25 15	

XC7A200T-1FBG676C

U4E

IO 0 16	H17
IO L1 P T0 16	H14
IO L1N T0 16	J15
IO L2P T0 16	G17
IO L2N T0 16	F17
IO L3P T0 DQS 16	F18
IO L3N T0 DQS 16	F19
IO L4P T0 16	G15
IO L4N T0 16	F15
IO L5P T0 16	G19
IO L5N T0 16	F20
IO L6P T0 16	H16 RGBLED_EN
IO L6N TO VREF 16	G16 RGBLED0
IO L7P T1 16	C17
IO L7N T1 16	B17
IO L8P T1 16	E16
IO L8N T1 16	D16
IO L9P T1 DQS 16	A17
IO L9N T1 DQS 16	A18
IO L10P T1 16	B19
IO L10N T1 16	A19
IO L11P T1 SRCC 16	E17 ANALOG3_DIGITAL
IO L11N T1 SRCC 16	E18 ANALOG4_DIGITAL
IO L12P T1 MRCC 16	D18 ANALOG5_DIGITAL
IO L12N T1 MRCC 16	E18 APPSPI_CLK
IO L13P T2 MRCC 16	E19 APPSPI_D0
IO L13N T2 MRCC 16	E20 APPSPI_D1
IO L14P T2 SRCC 16	D20 APPSPI_D2
IO L14N T2 SRCC 16	B20 APPSPI_D3
IO L15P T2 DQS 16	A20 APPSPI_CS
IO L15N T2 DQS 16	C21
IO L16P T2 16	B21
IO L16N T2 16	B22
IO L17P T2 16	A22
IO L17N T2 16	A21
IO L18P T2 16	D21
IO L18N T2 16	C22
IO L19P T3 16	C23
IO L19N T3 VREF 16	B25
IO L20P T3 16	B25
IO L20N T3 16	A25
IO L21P T3 DQS 16	A23
IO L21N T3 DQS 16	A24
IO L22P T3 16	C26
IO L22N T3 16	B26
IO L23P T3 16	C24
IO L23N T3 16	B24
IO L24P T3 16	D23
IO L24N T3 16	D24
IO 25 16	E22

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Title: IO Banks 15 + 16

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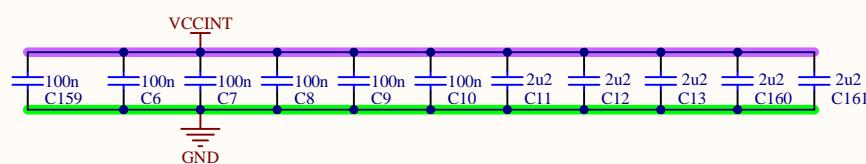
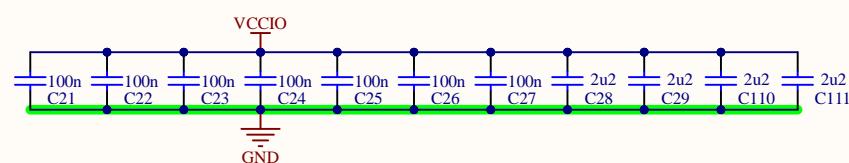
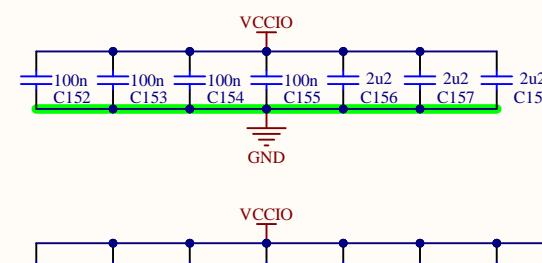
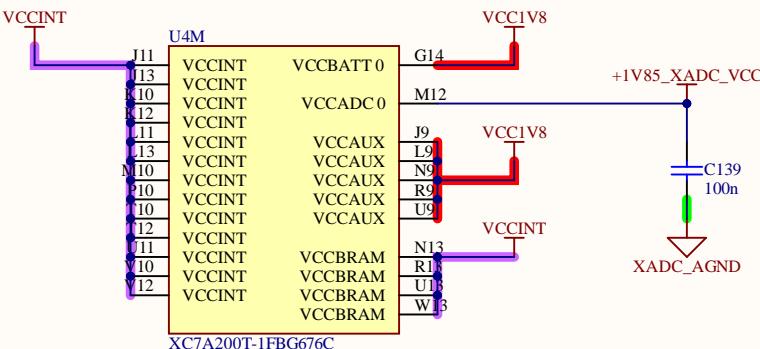
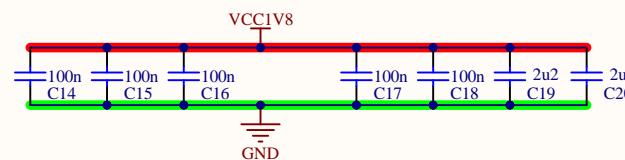
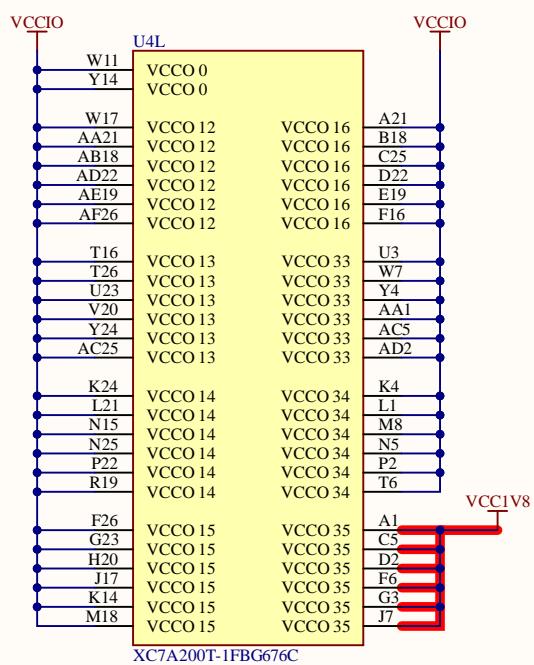
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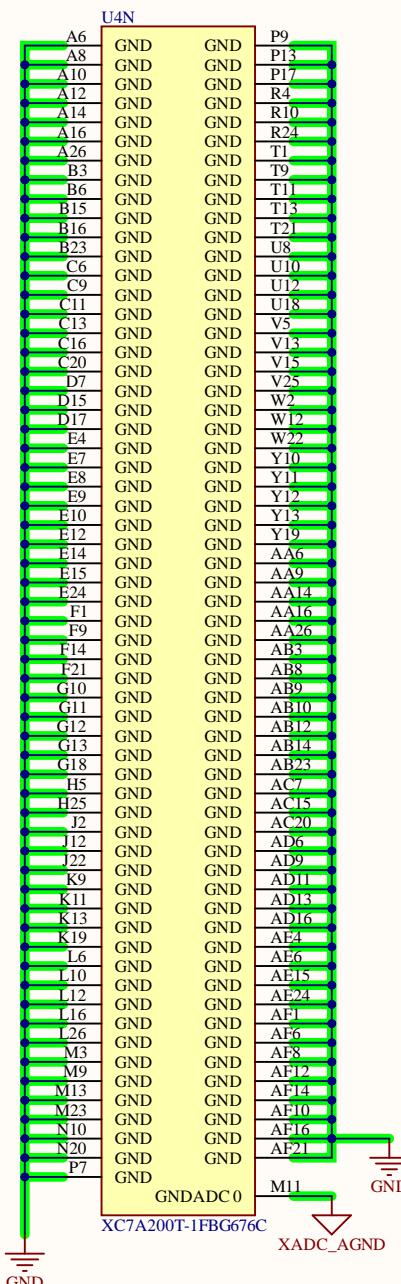
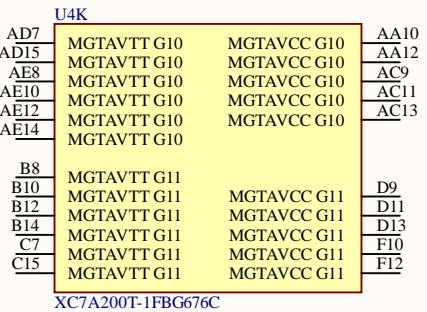
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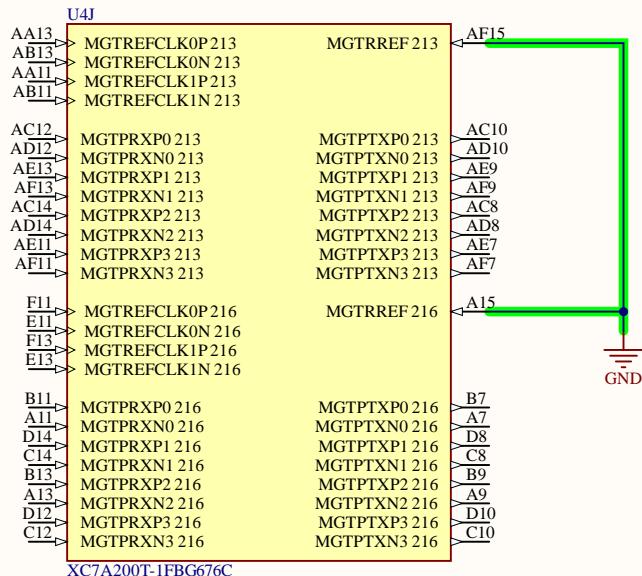




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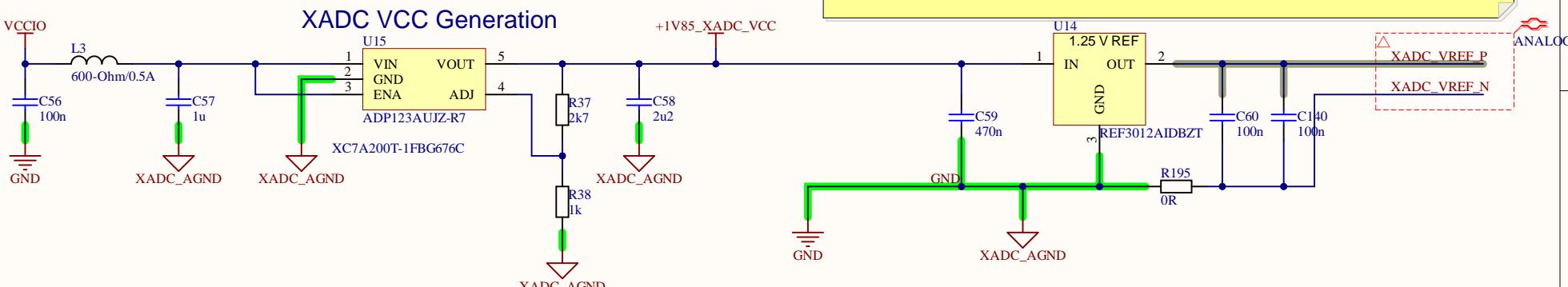
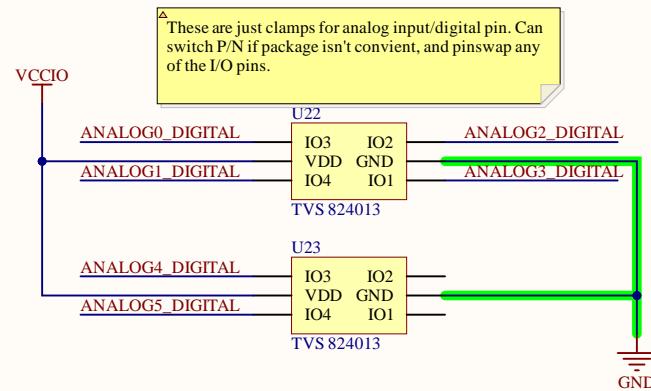
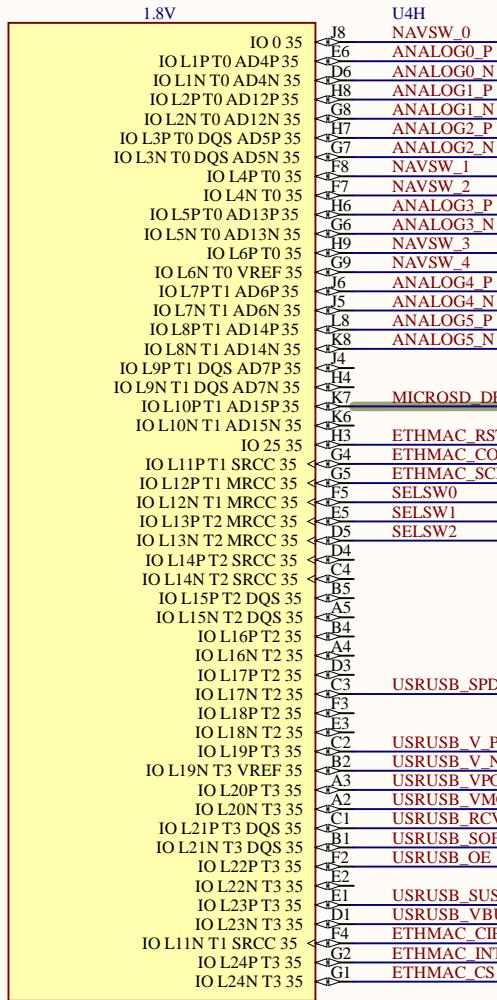


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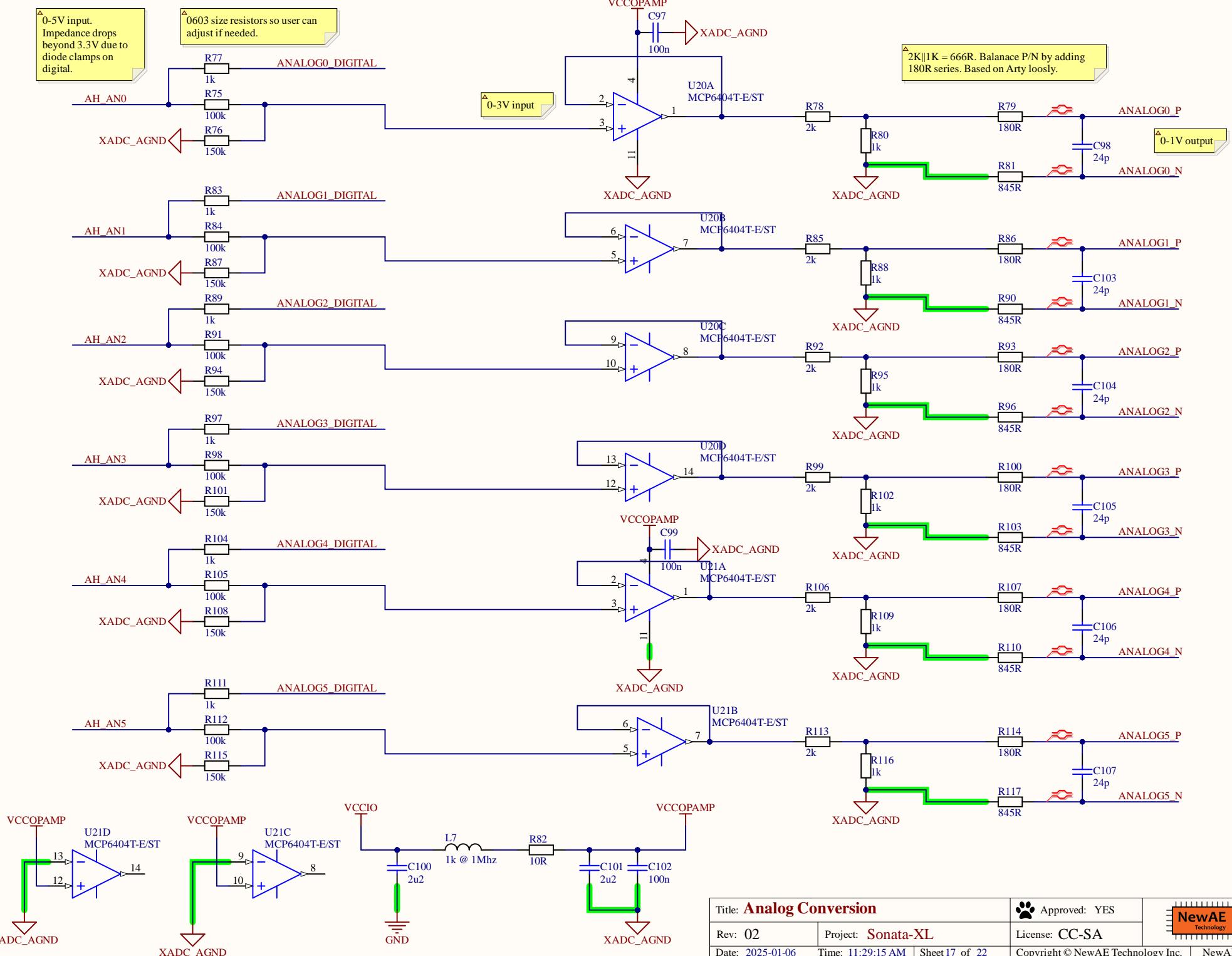
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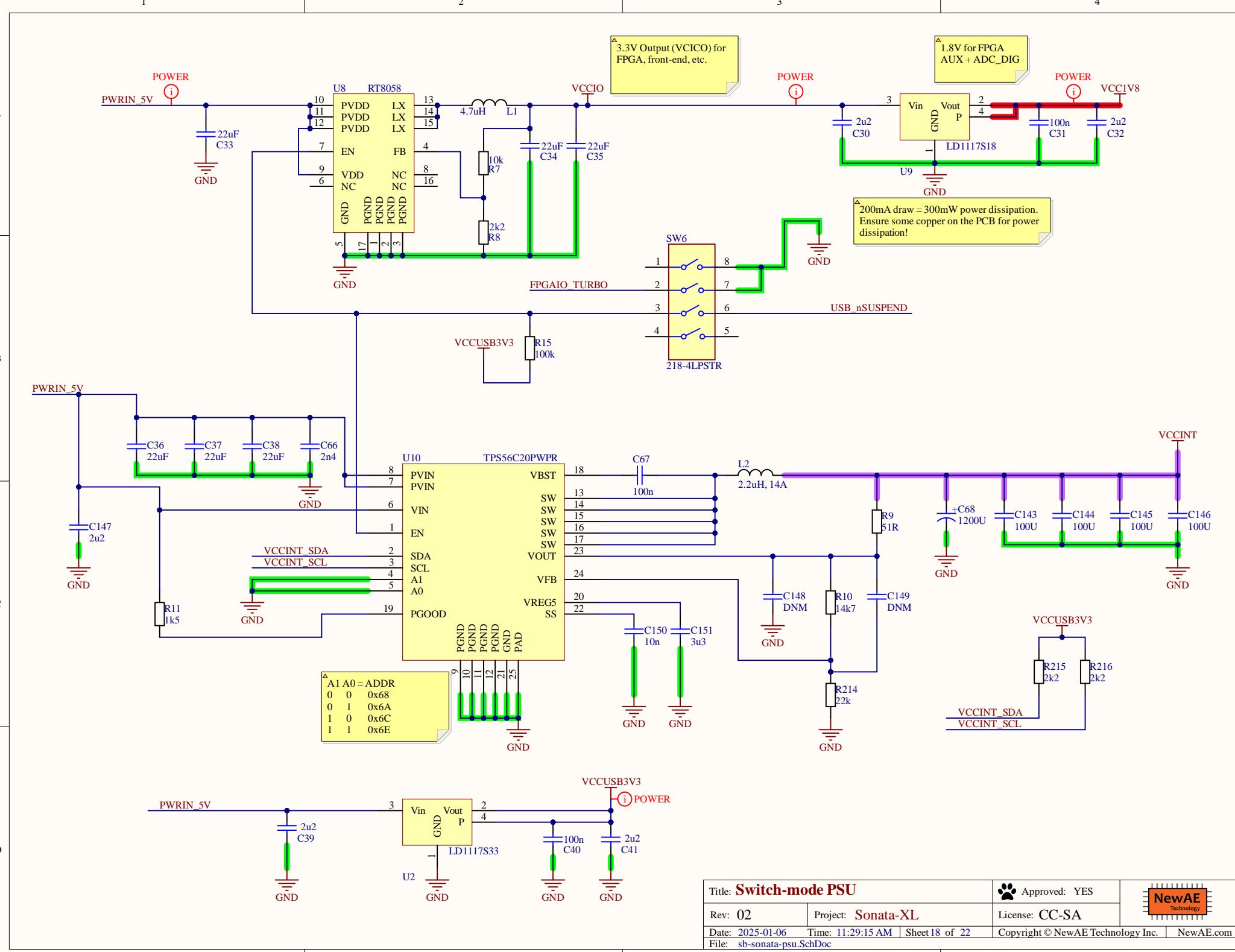
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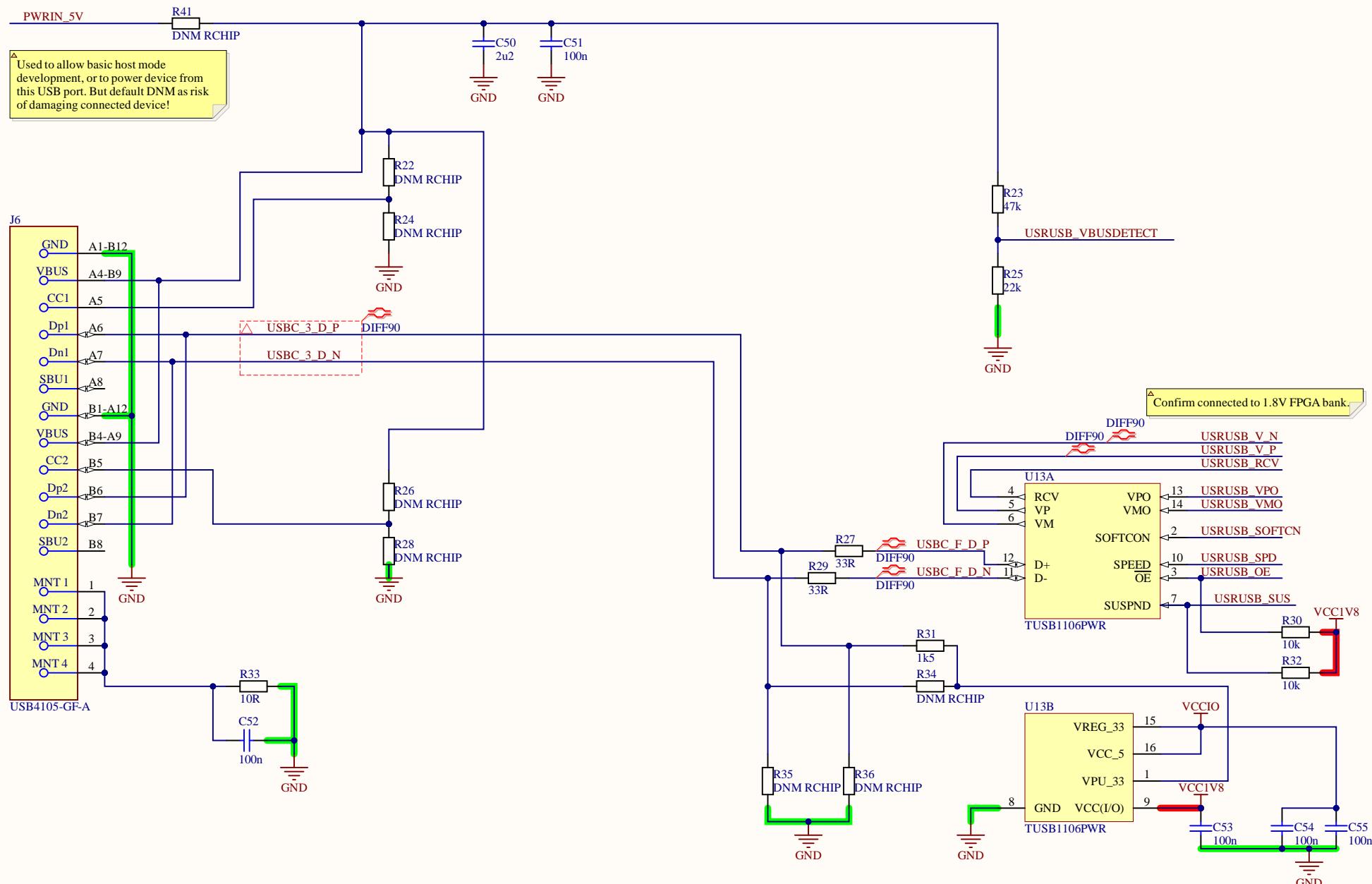


Title: FPGA Analog + 1.8V Bank

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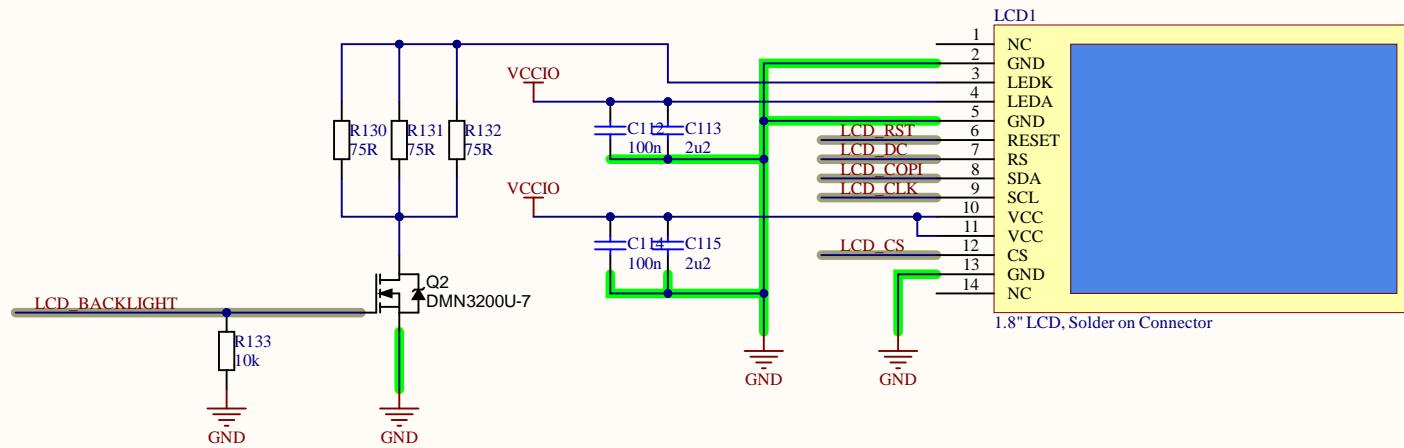






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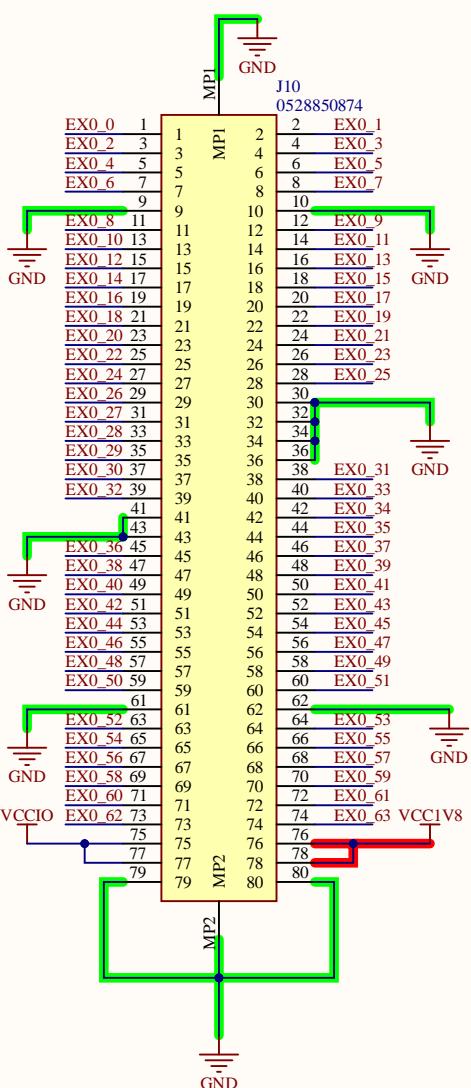
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D

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File: sb-sonata-lcd.SchDoc			

U4F

AE5 EX0_0
 IO L15N T2 DQS 33
 IO 25 33
 IO L17P T2 33
 IO L21P T3 DQS 33
 IO L15P T2 DQS 33
 IO L6P T0 33
 IO L17N T2 33
 IO L6N T0 VREF 33
 IO L16N T2 33
 IO L23P T3 33
 IO L16P T2 33
 IO L23N T3 33
 IO L10N T1 33
 IO LAP T0 33
 IO L10P T1 33
 IO L19N T3 VREF 33
 IO L9N T1 DQS 33
 AE1 EX0_16
 IO LAN T0 33
 IO L9P T1 DQS 33
 IO L24N T3 33
 IO L11N T1 SRCC 33
 AC2 EX0_20
 AB5 EX0_21
 IO L22N T3 33
 AC1 EX0_22
 IO L7N T1 33
 IO L18P T2 33
 AB2 EX0_24
 IO L1PT1 SRCC 33
 AD4 EX0_25
 IO L18N T2 33
 IO L7PT1 33
 IO LIN T0 33
 IO L12N T1 MRCC 33
 IO L1P T0 33
 IO L14N T2 SRCC 33
 IO L8N T1 33
 IO L14P T2 SRCC 33
 IO L13N T2 MRCC 33
 IO L22P T3 33
 IO L3P T0 DQS 33
 IO L13P T2 MRCC 33
 IO L8P T1 33
 IO L12P T1 MRCC 33
 IO L3N T0 DQS 33
 IO L20P T3 33
 IO L20N T3 33
 IO L5N T0 33
 IO L24P T3 33
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 IO L5P T0 33
 IO L21N T3 DQS 33
 IO L2N T0 33

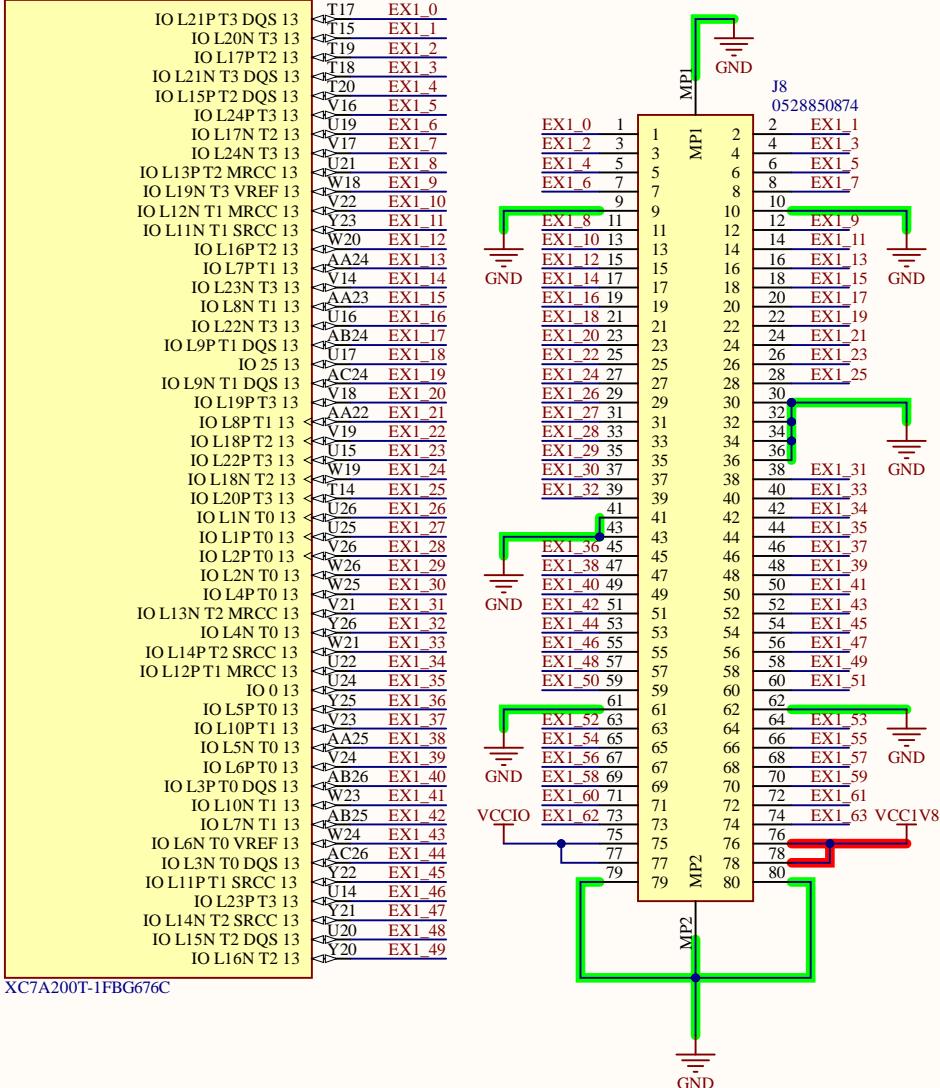


XC7A200T-1FBG676C

U4B

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 IO L21P T3 DQS 13
 IO L20N T3 13
 IO L17P T2 13
 IO L21N T3 DQS 13
 IO L15P T2 DQS 13
 IO L24P T3 13
 IO L17N T2 13
 IO L24N T3 13
 IO L13P T2 MRCC 13
 IO L19N T3 VREF 13
 IO L12N T1 MRCC 13
 IO L11N T1 SRCC 13
 IO L16P T2 13
 IO L7PT1 13
 IO L23N T3 13
 IO LSN T1 13
 IO L22N T3 13
 IO L9PT1 DQS 13
 IO 25 13
 IO L9N T1 DQS 13
 AC24 EX1_19
 IO L19P T3 13
 AA22 EX1_21
 IO L8PT1 13
 V19 EX1_22
 IO L18P T2 13
 T15 EX1_23
 IO L22P T3 13
 W19 EX1_24
 IO L18N T2 13
 T14 EX1_25
 IO L20P T3 13
 T26 EX1_26
 IO L10N T1 13
 U25 EX1_27
 IO L1P T0 13
 V26 EX1_28
 IO L2N T0 13
 W26 EX1_29
 IO L4P T0 13
 V21 EX1_31
 IO L13N T2 MRCC 13
 T26 EX1_32
 IO L4N T0 13
 W21 EX1_33
 IO L14P T2 SRCC 13
 U22 EX1_34
 IO L12P T1 MRCC 13
 T24 EX1_35
 IO 10 13
 Y25 EX1_36
 IO L5P T0 13
 V23 EX1_37
 IO L10P T1 13
 AA25 EX1_38
 IO L5N T0 13
 V24 EX1_39
 IO L6P T0 13
 AB26 EX1_40
 IO L10N T1 13
 AB25 EX1_42
 IO L7N T1 13
 V24 EX1_43
 IO L6N T0 VREF 13
 AC26 EX1_44
 IO L3N T0 DQS 13
 Y22 EX1_45
 IO L11P T1 SRCC 13
 V14 EX1_46
 IO L23P T3 13
 Y21 EX1_47
 IO L14N T2 SRCC 13
 U20 EX1_48
 IO L15N T2 DQS 13
 Y20 EX1_49
 IO L16N T2 13

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XC7A200T-1FBG676C

Title: Expansion pin headers

Rev: 02 Project: Sonata-XL

Date: 2025-01-06 Time: 11:29:15 AM Sheet 21 of 22

File: sb-sonata-expandheader.SchDoc

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IO LIN T0 12	AE26 EX1_50
IO 0 12	AB22 EX1_51
IO L1P T0 12	AE25 EX1_52
IO L6N T0 VREF 12	AD24 EX1_53
IO L3N T0 DQS 12	AF25 EX1_54
IO L2N T0 12	AC23 EX1_55
IO L3P T0 DQS 12	AF24 EX1_56
IO L6P T0 12	AD23 EX1_57
IO L5P T0 12	AE23 EX1_58
IO L2P T0 12	AC22 EX1_59
IO L5N T0 12	AF23 EX1_60
IO L11N T1 SRCC 12	AC21 EX1_61
IO L7N T1 12	AE21 EX1_62
IO L7P T1 12	AD21 EX1_63
IO L15N T2 DQS 12	AD18 EX1_64
IO L8P T1 12	AF19
IO L8N T1 12	AF20
IO L9P T1 DQS 12	AE22
IO L9N T1 DQS 12	AF22
IO L14P T2 SRCC 12	AC19 EX0_50
IO L4N T0 12	AD26 EX0_51
IO L15P T2 DQS 12	AC18 EX0_52
IO L4P T0 12	AD25 EX0_53
IO L13N T2 MRCC 12	AB19 EX0_54
IO L11P T1 SRCC 12	AB21 EX0_55
IO L12N T1 MRCC 12	AB20 EX0_56
IO L16N T2 12	AF18 EX0_57
IO L14N T2 SRCC 12	AD19 EX0_58
IO L10P T1 12	AD20 EX0_59
IO L12P T1 MRCC 12	AA20 EX0_60
IO L13P T2 MRCC 12	AA19 EX0_61
IO L16P T2 12	AE18 EX0_62
IO L10N T1 12	AE20 EX0_63
IO L17P T2 12	Y18
IO L17N T2 12	AA18
IO L18P T2 12	AE17
IO L18N T2 12	AF17
IO L19P T3 12	AA17
IO L19N T3 VREF 12	AB17
IO L20P T3 12	AC17
IO L20N T3 12	AD17
IO L21P T3 DQS 12	Y16
IO L21N T3 DQS 12	Y17
IO L22P T3 12	AB16
IO L22N T3 12	AC16
IO L23P T3 12	Y15
IO L23N T3 12	AA15
IO L24P T3 12	W14
IO L24N T3 12	W15
IO 25 12	W16

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B

B

C

C

D

D

Title: Additional Expansion Pins

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