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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

△ 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.
 - *PUDC line needs to be pulled down (production mod applied, will be on -09 PCB rev)



M3, Tight Fit



M3, Tight Fit



M3, Tight Fit



M3, Tight Fit



M3, Tight Fit



M3, Tight Fit

Title: Mechanical & Title Page

Rev: 08

Project: Sonata

Date: 2024-02-25

Time: 2:37:42 PM

Sheet 1 of 20

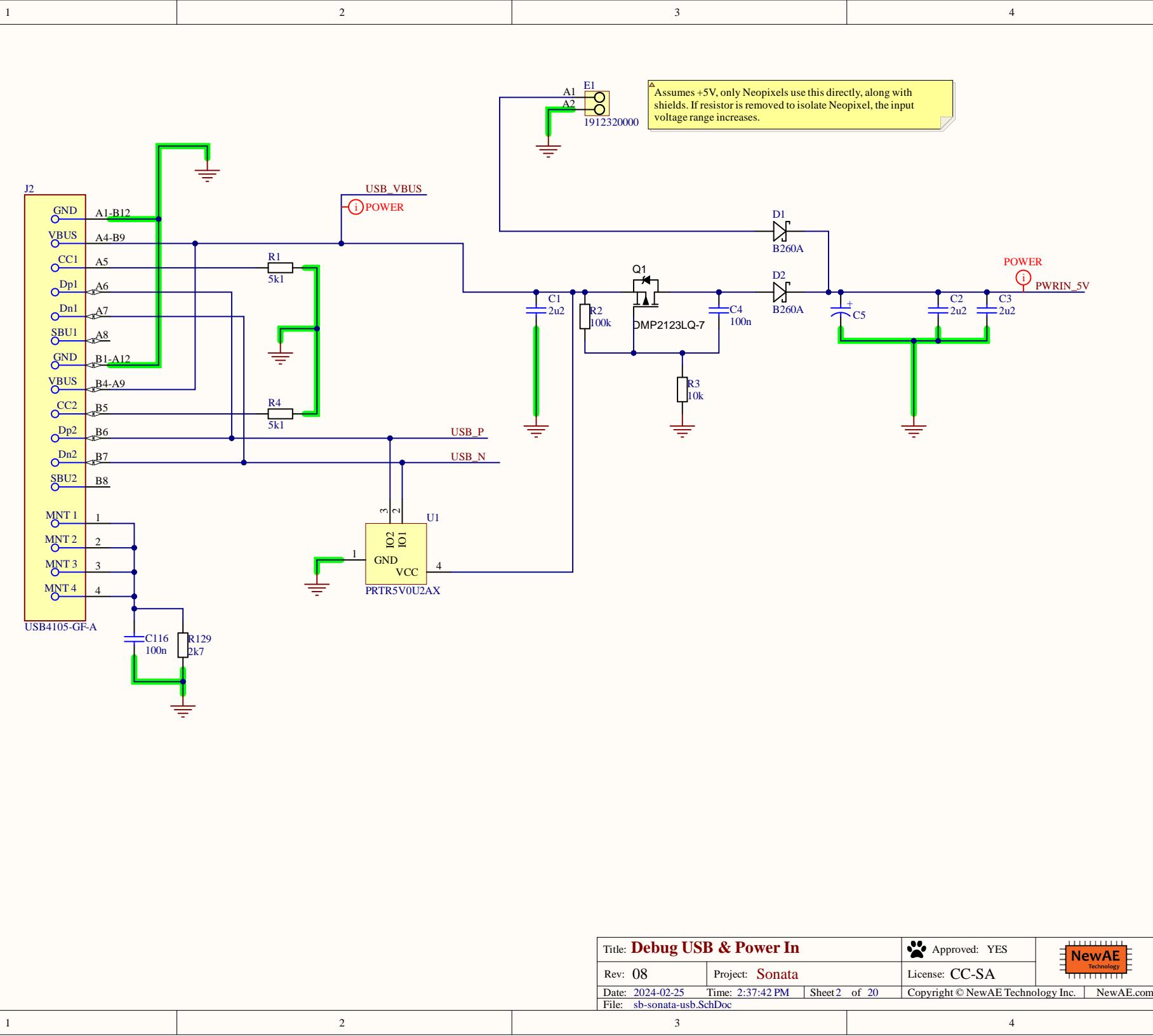
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Approved: YES



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Title: Debug USB & Power In		Approved: YES	NewAE Technology
Rev: 08	Project: Sonata	License: CC-SA	
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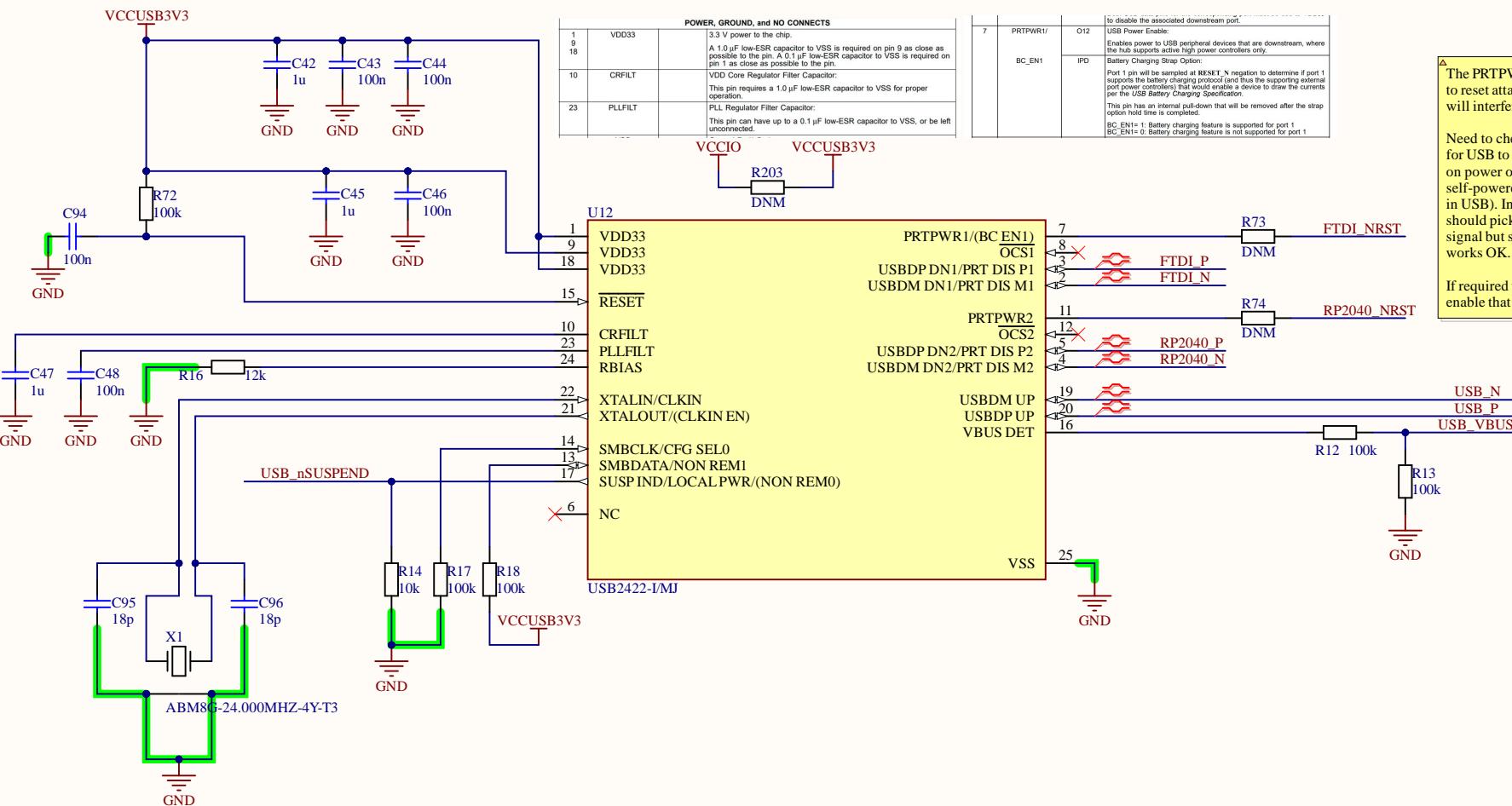
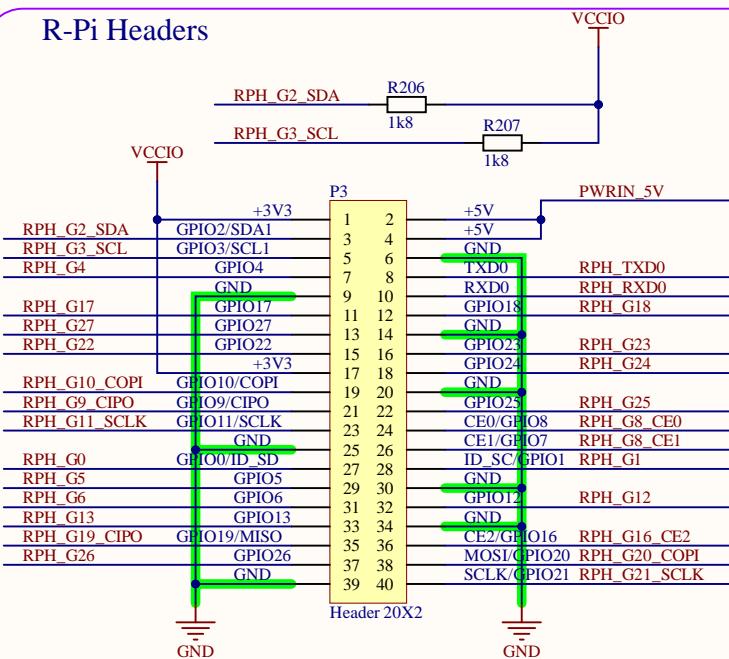


TABLE 4-1: HUB CONFIGURATION OPTIONS

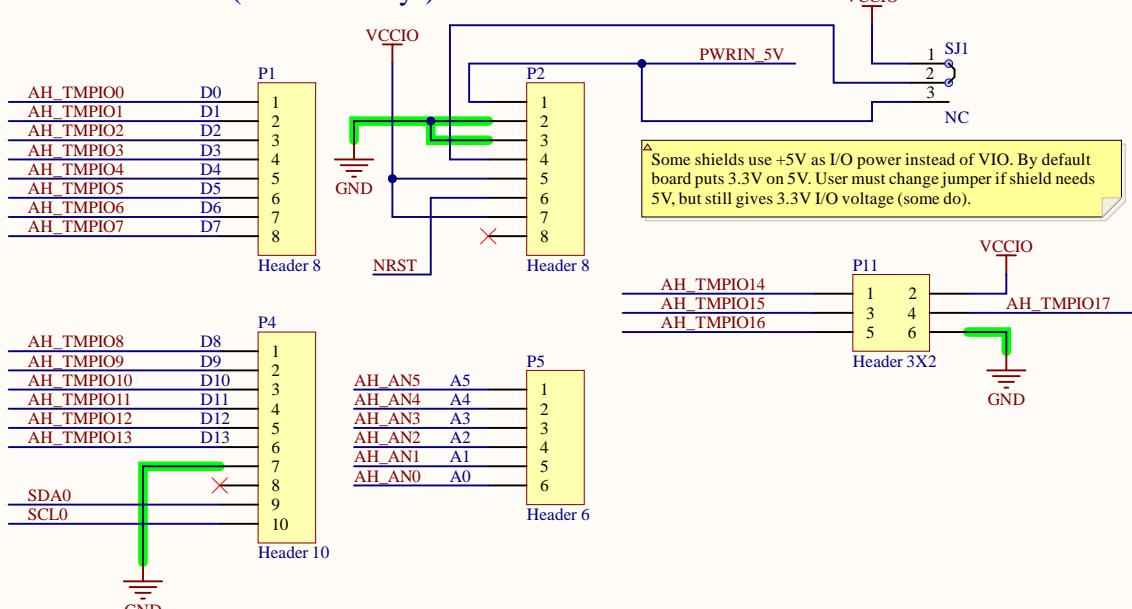
CFG_SEL	Description
0	Default configuration: <ul style="list-style-type: none">• Strap options enabled• Hub descriptors indicate the hub as "self-powered"
1	The hub is configured externally over SMBus (as an SMBus slave device with address 0101100b): <ul style="list-style-type: none">• Strap options disabled• Self-powered or bus-powered depending on register settings• All registers configured over SMBus

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

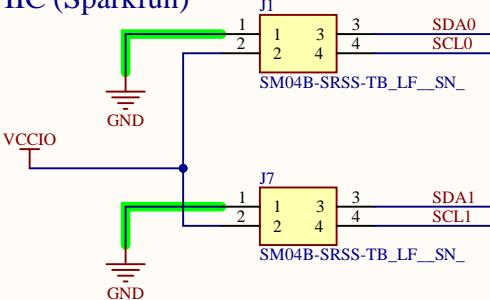
R-Pi Headers



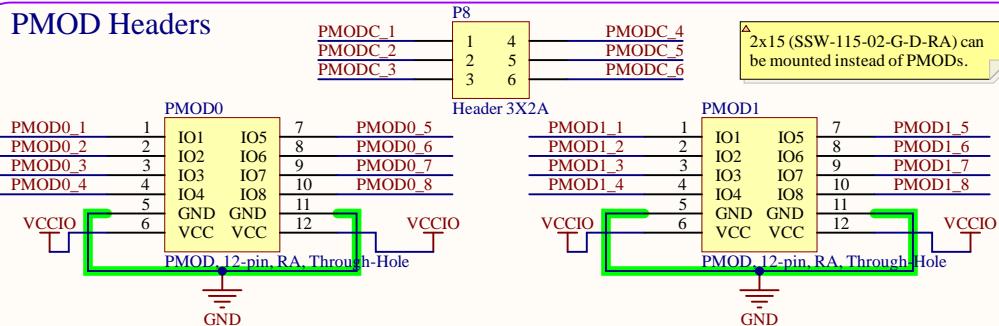
Arduino Headers (3.3V I/O only!)



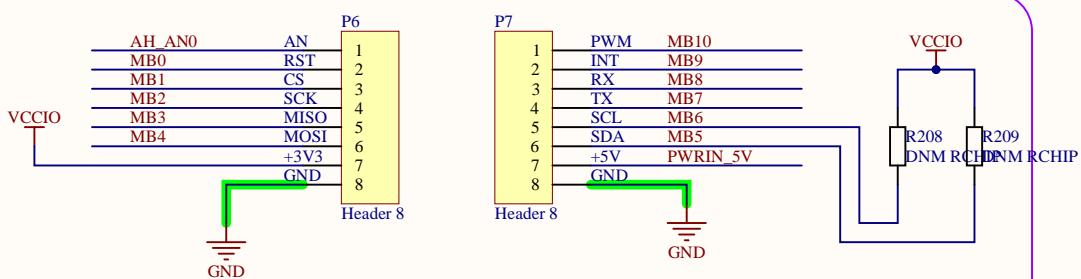
QWIIC (Sparkfun)



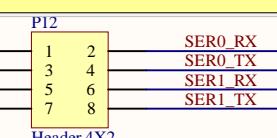
PMOD Headers



mikroBUS Click



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



Title: **Header Pins**

Rev: 08

Project: **Sonata**

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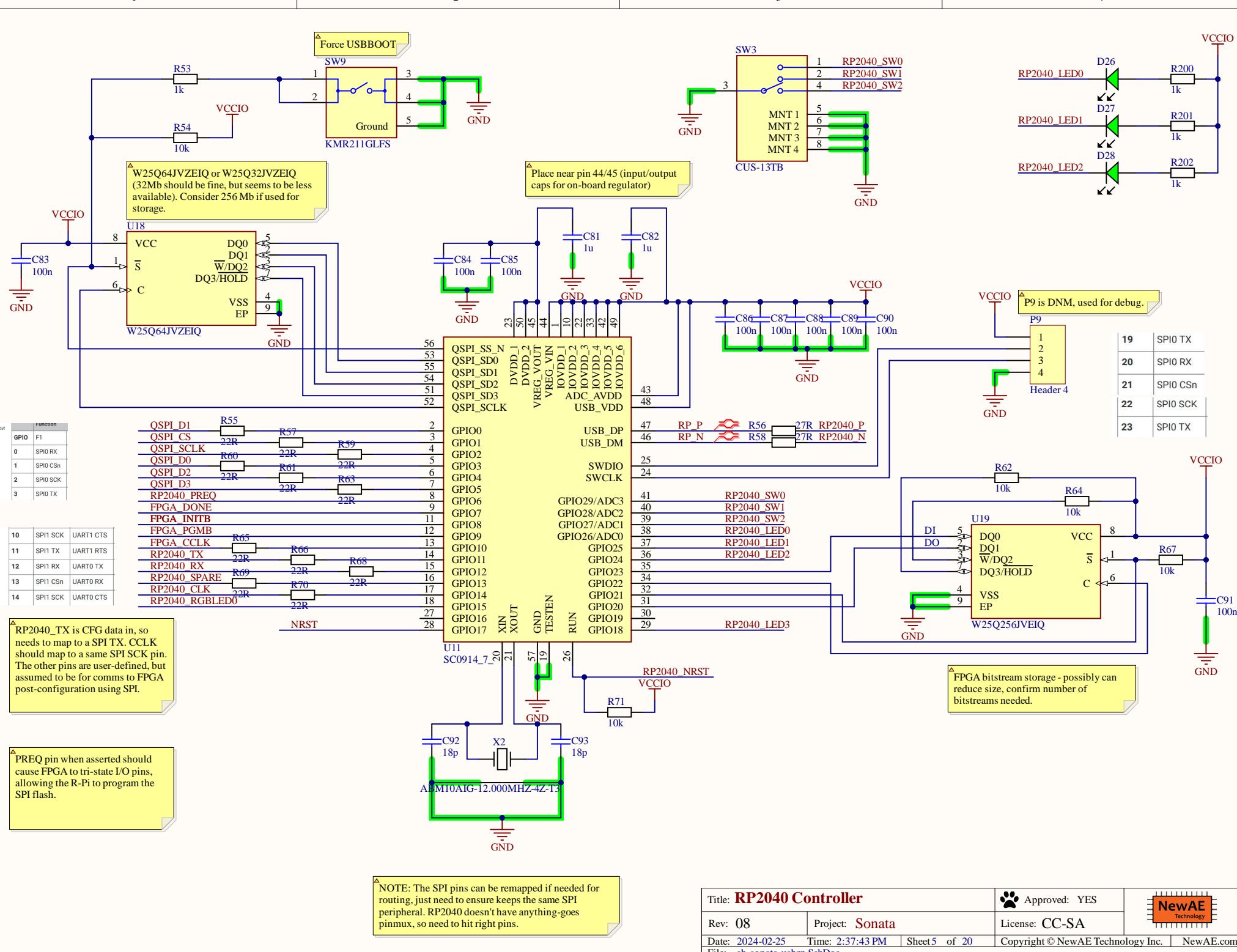
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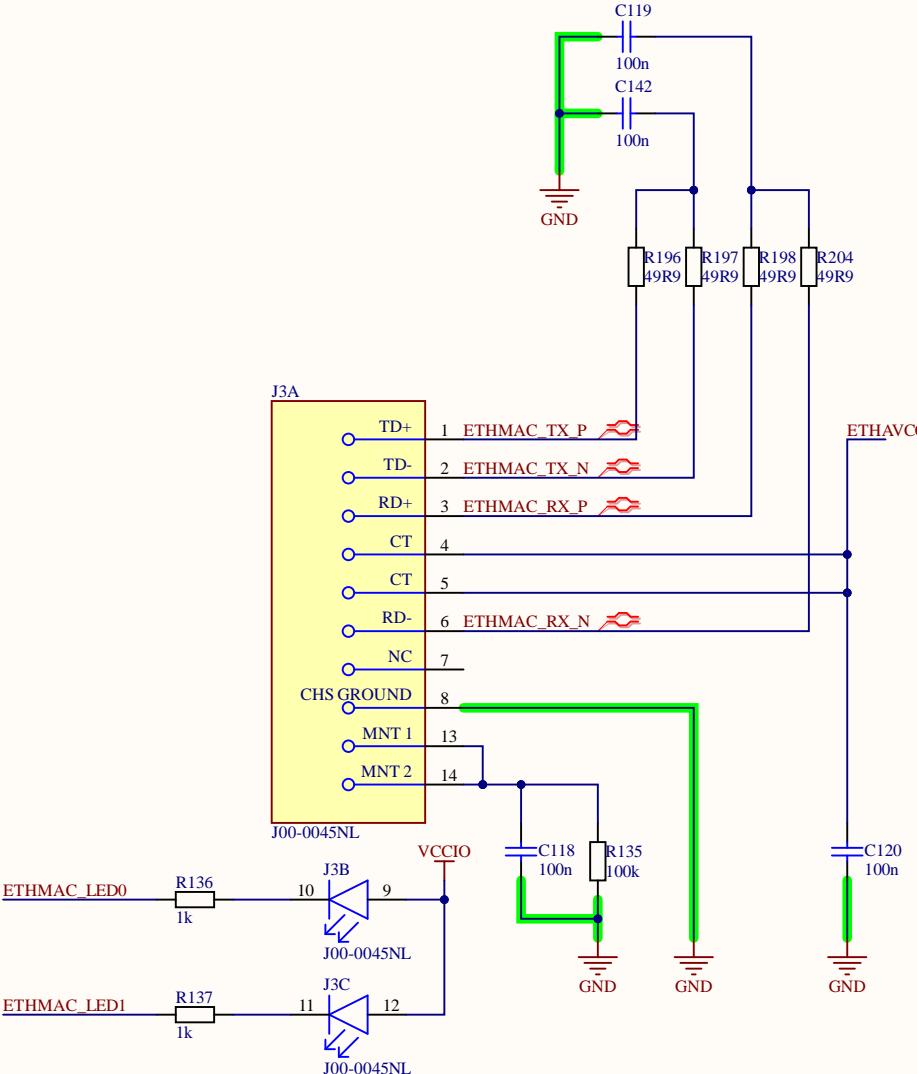
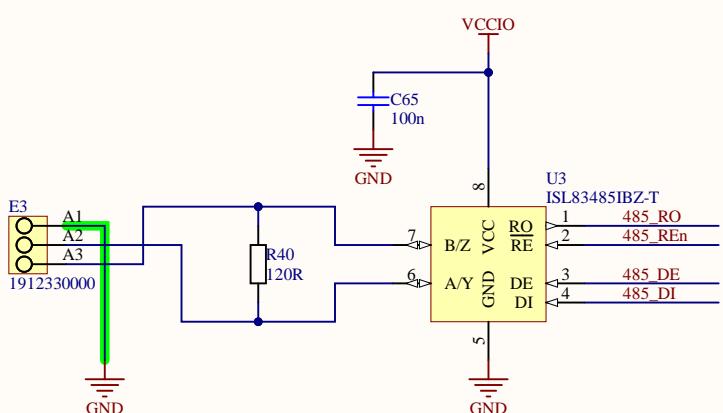
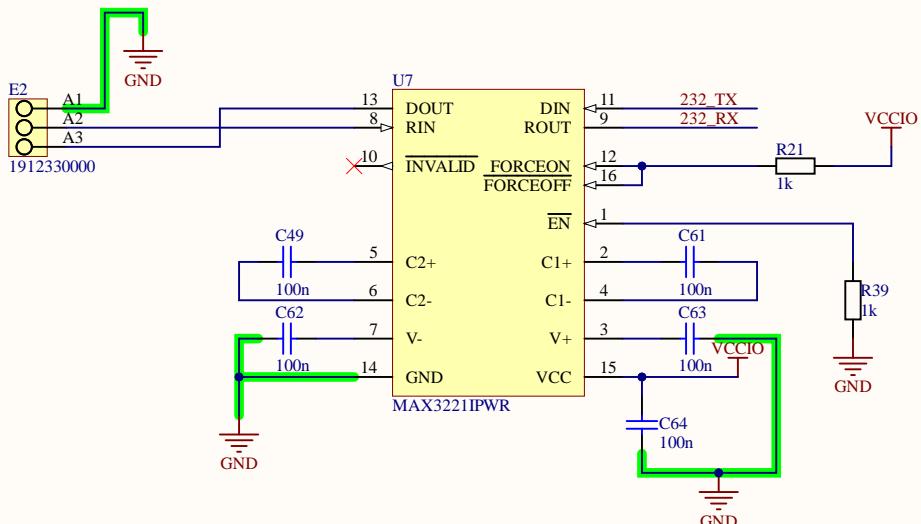
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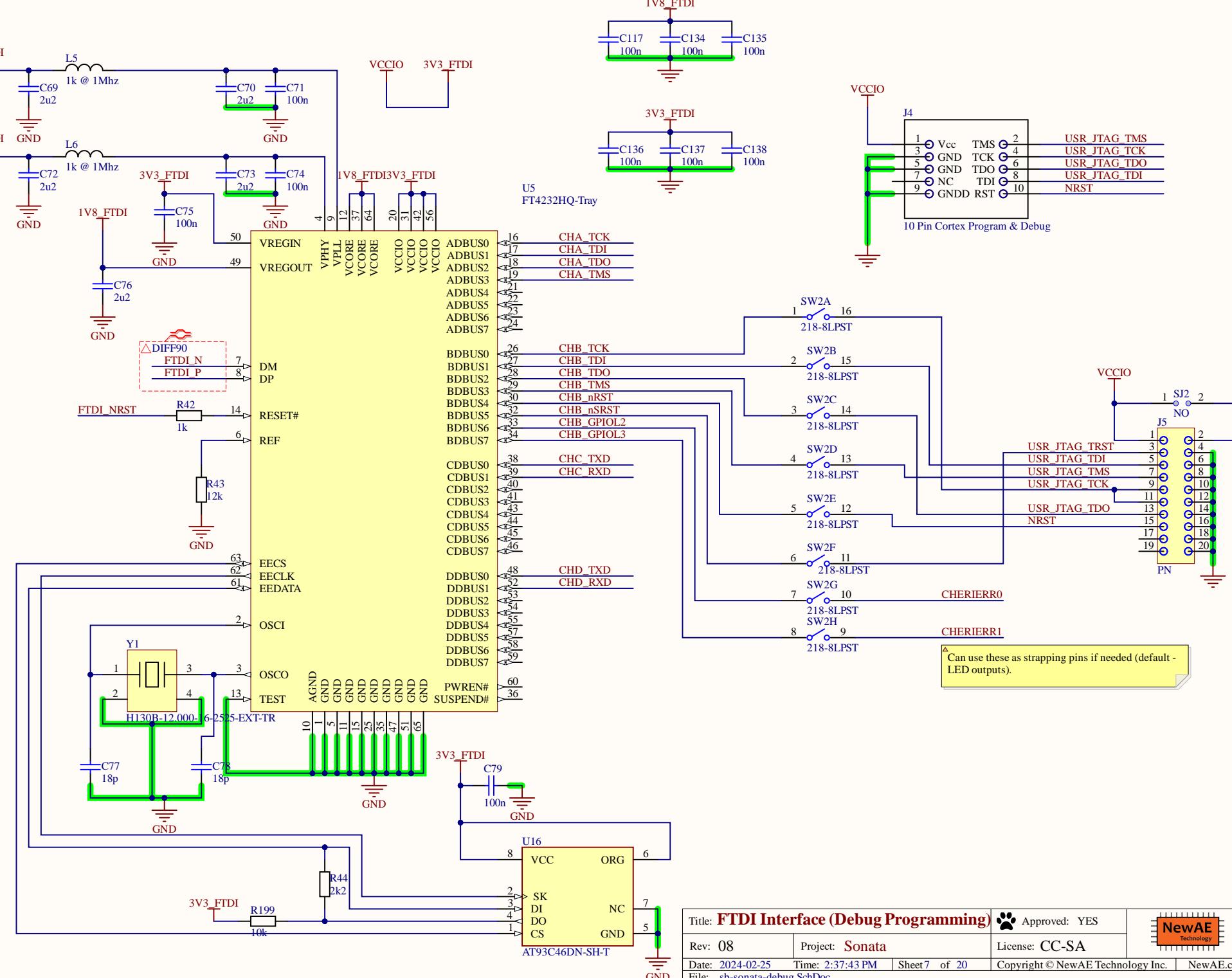


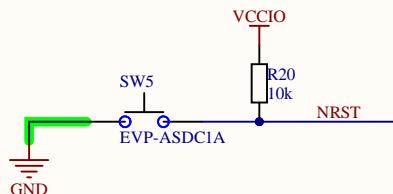
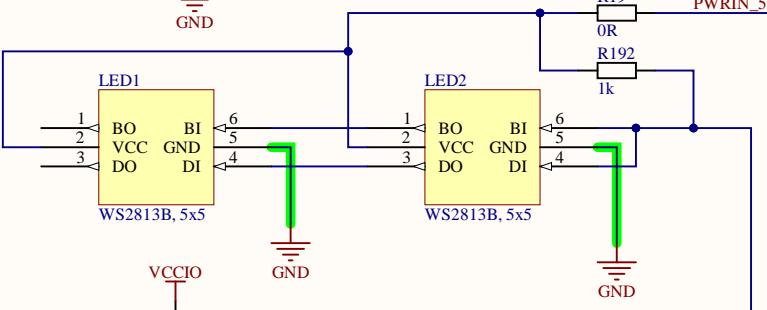
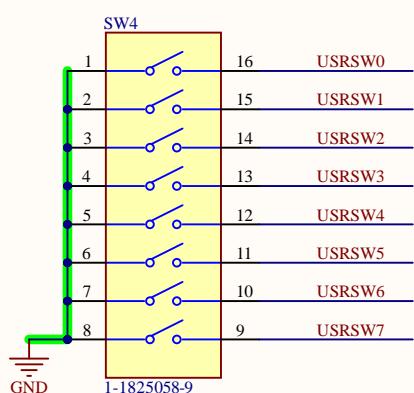
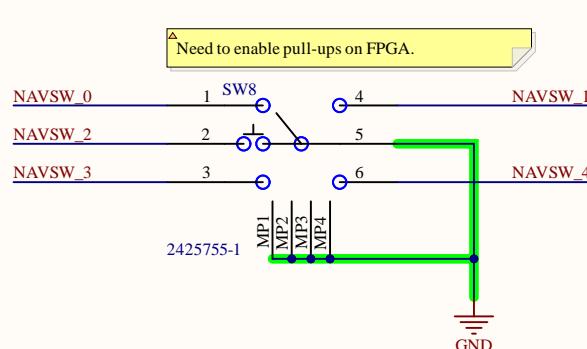
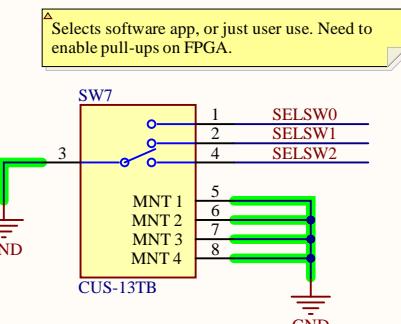
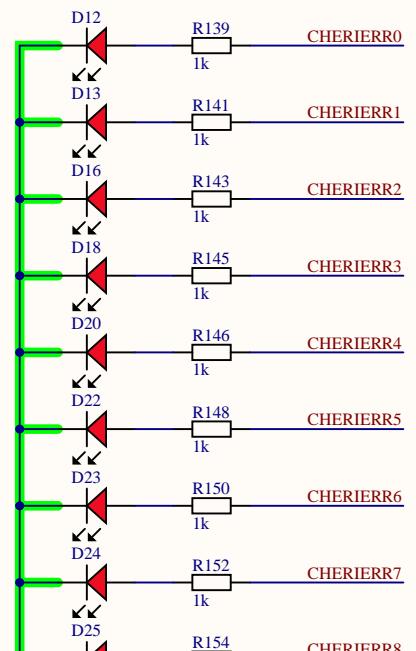
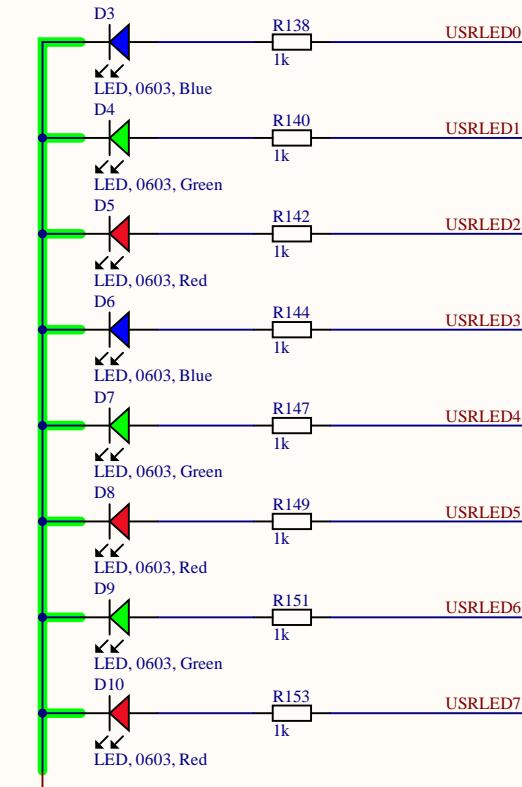
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Title: RS485,RS232,Eth Connectors		 Approved: YES	
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Title: LEDs and Switches

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A

A

B

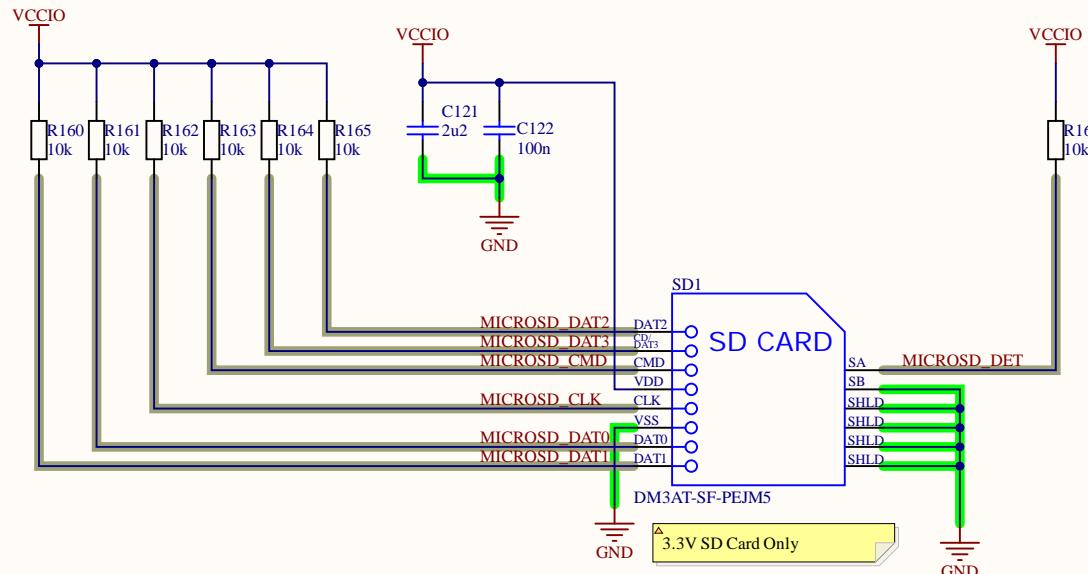
B

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D

D



Title: MicroSD Card Connector

Approved: YES



Rev: 08

Project: Sonata

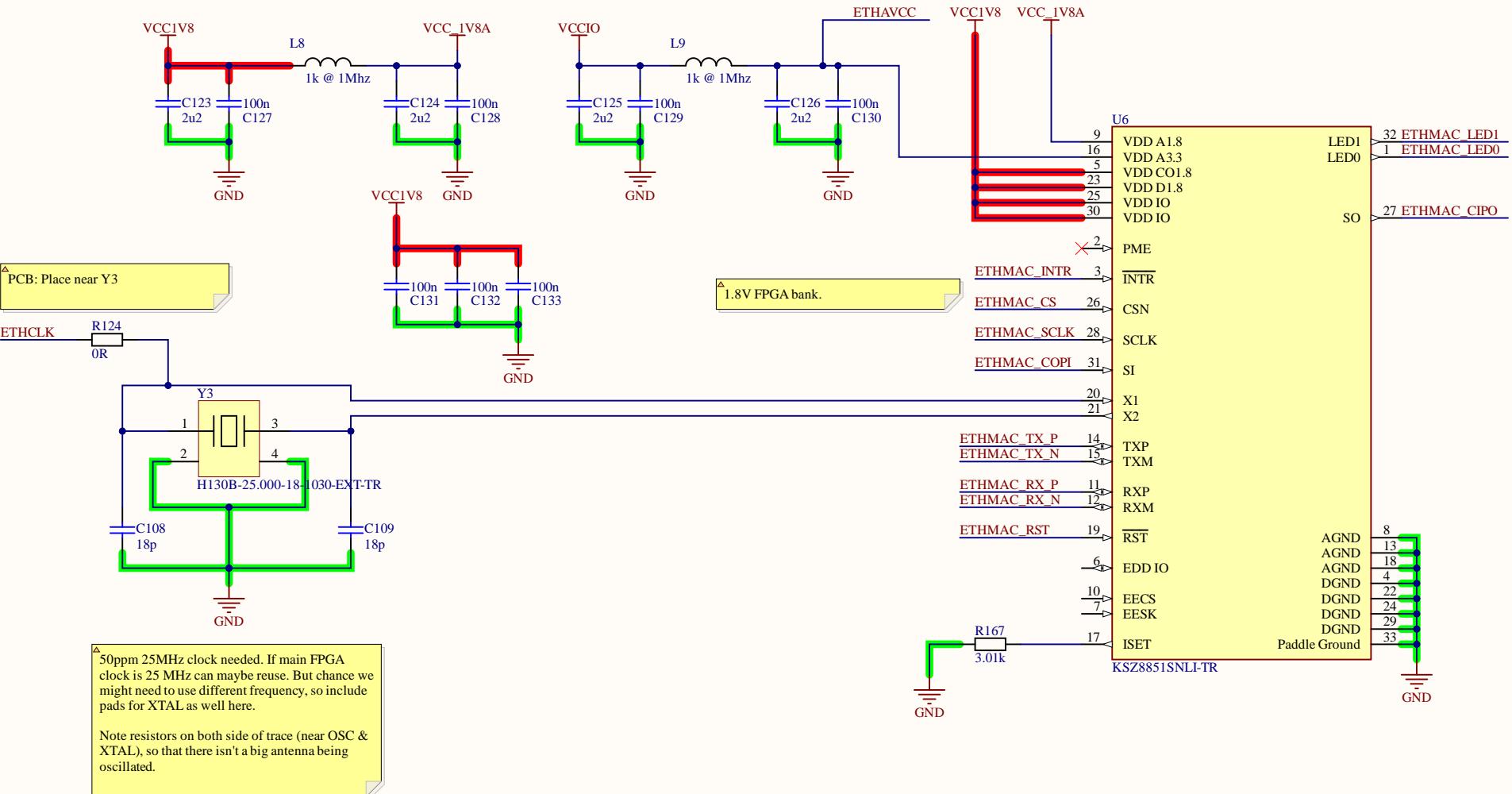
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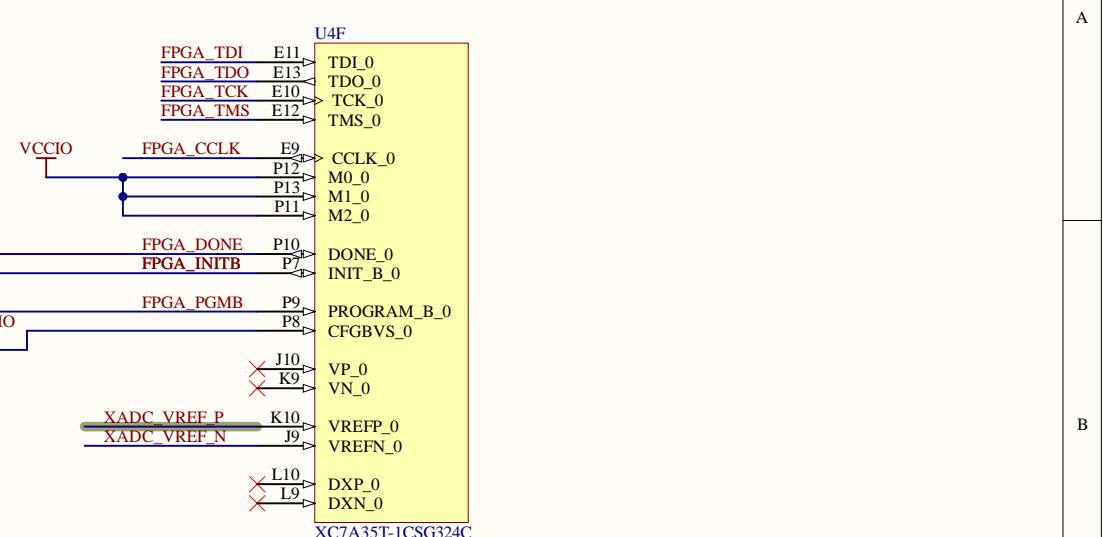
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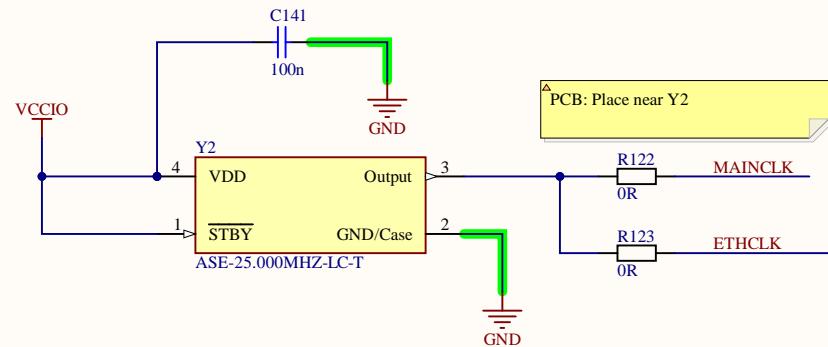
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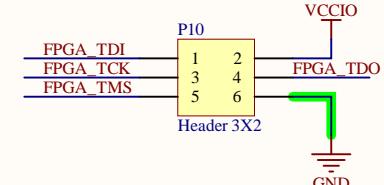
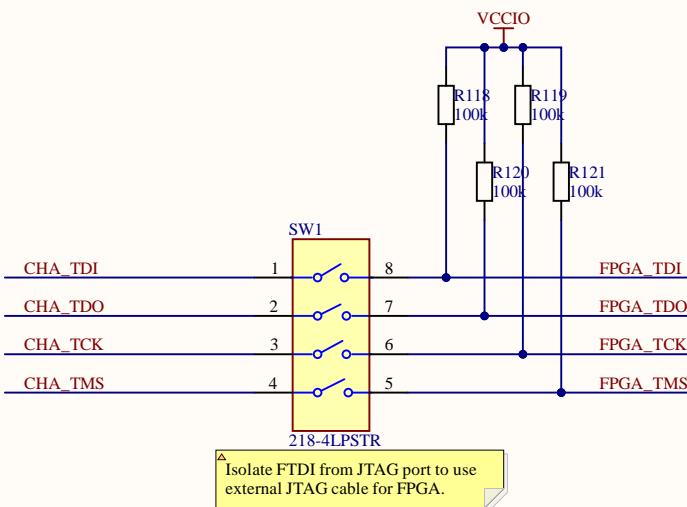
A



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Non-standard. Roughly based on AVR 6-pin ISP header.

D

Title: **FPGA Config & Misc**Rev: 08 Project: **Sonata**

Date: 2024-02-25 Time: 2:37:43 PM Sheet 11 of 20

File: sb-sonata-fpga.SchDoc

Approved: YES



U4A

IO_0_14	R11 R183C 33R	RPH_G8_CE1
IO_L19P_T3_A10_D26_14	T11 R188A 33R	AH_TMPIO0
IO_L20P_T3_A08_D24_14	U12 R188B 33R	AH_TMPIO1
IO_L5P_T0_D06_14	R12 R188C 33R	AH_TMPIO2
IO_L23N_T3_A02_D18_14	U13 R188D 33R	AH_TMPIO3
IO_25_14	R10 R189A 33R	AH_TMPIO4
IO_L20N_T3_A07_D23_14	V12 R189B 33R	AH_TMPIO5
IO_L19N_T3_A09_D25_VREF_14	U11 R189C 33R	AH_TMPIO6
IO_L4N_T0_D05_14	M18 R189D 33R	AH_TMPIO7
IO_L17N_T2_A13_D29_14	U18 R190A 33R	AH_TMPIO8
IO_L15N_T2_DQS_DOUT_CSO_B_14	T16 R190B 33R	AH_TMPIO9
IO_L18P_T2_A12_D28_14	U16 R190C 33R	AH_TMPIO10
IO_L7N_T1_D10_14	T18 R190D 33R	AH_TMPIO11
IO_L15P_T2_DQS_RDWR_B_14	R16 R191A 33R	AH_TMPIO12
IO_L12N_T1_MRCC_14	R17 R191B 33R	AH_TMPIO13
IO_L7P_T1_D09_14	R18 R191C 33R	AH_TMPIO14
IO_L8N_T1_D12_14	P14 R191D 33R	AH_TMPIO15
IO_L9P_T1_DQS_14	N17 R169 22R	AH_TMPIO16
IO_L6N_T0_D08_VREF_14	M13 R169 22R	AH_TMPIO17
IO_L10P_T1_D14_14	M16 R175D 33R	RPH_G3_SCL
IO_L10N_T1_D15_14		RP2040_RX
IO_L4P_T0_D04_14	L18 R175A 33R	RPH_RXD0
IO_L1P_T0_D00_MOSL_14	K17 R175B 33R	RPH_TXD0
IO_L6P_T0_FCS_B_14	L13 R175C 33R	RPH_G2_SDA
IO_LIN_T0_D01_DIN_14	K18 R175D 33R	RP2040_TX
IO_L13P_T2_MRCC_14	P15 MAINCLK	
IO_L11P_T1_SRCC_14	N15 R177A 33R	RPH_G4
IO_L2N_T0_D03_14	M14 R177B 33R	RPH_G17
IO_L2P_T0_D02_14	L14 R177C 33R	RPH_G27
IO_L3N_T0_DQS_EMCLLK_14	L16 R177D 33R	RPH_G22
IO_L16N_T2_A15_D31_14	V16 R179A 33R	RPH_G10_COPI
IO_L18N_T2_A11_D27_14	V17 R179B 33R	RPH_G9_CIPO
IO_L12P_T1_MRCC_14	P17 R179C 33R	RPH_G11_SCLK
IO_L17P_T2_A14_D30_14	U17 R179D 33R	RPH_G0
IO_L23P_T3_A03_D19_14	T13 R181A 33R	RPH_G5
IO_L22P_T3_A05_D21_14	U14 R181B 33R	RPH_G6
IO_L5N_T0_D07_14	R13 R181C 33R	RPH_G13
IO_L22N_T3_A04_D20_14	V14 R181D 33R	RPH_G19_CIPO
IO_L13N_T2_MRCC_14	R15 R182A 33R	RPH_G26
IO_L9N_T1_DQS_D13_14	P18 R182B 33R	RPH_G18
IO_L8P_T1_D11_14	N14 R182C 33R	RPH_G23
IO_L11N_T1_SRCC_14	N16 R182D 33R	RPH_G24
IO_L3P_T0_DQS_PUDC_B_14	L15 R183A 33R	RPH_G25
IO_L16P_T2_CSI_B_14	V15 R183B 33R	RPH_G8_CE0
IO_L14P_T2_SRCC_14		RP2040_CLK
IO_L21P_T3_DQS_14	T14 R183C 33R	RPH_G1
IO_L24P_T3_A01_D17_14	V10 R185A 33R	RPH_G12
IO_L24N_T3_A00_D16_14	T9 R185B 33R	RPH_G16_CE2
IO_L21N_T3_DQS_A06_D22_14	T10 R185C 33R	RPH_G20_COPI
	V11 R185D 33R	RPH_G21_SCLK

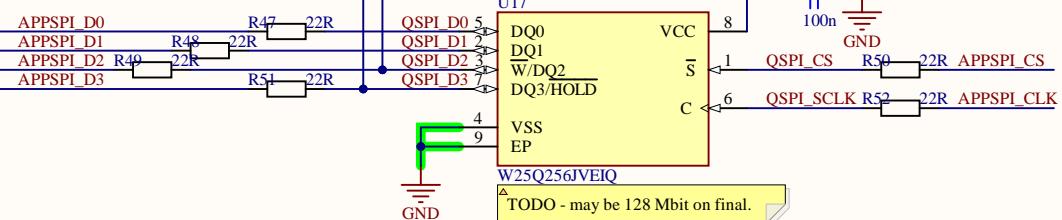
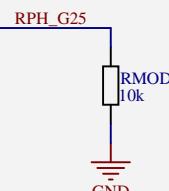
XC7A35T-1CSG324C

BANK 34

K6	IO_0_34	CHERIERR0
L1	IO_L1P_T0_34	CHERIERR1
M1	IO_L1N_T0_34	CHERIERR2
K3	IO_L2P_T0_34	CHERIERR3
L3	IO_L2N_T0_34	CHERIERR4
N2	IO_L3P_T0_DQS_34	CHERIERR5
N1	IO_L3N_T0_DQS_34	CHERIERR6
M3	IO_L4P_T0_34	CHERIERR7
M2	IO_L4N_T0_34	CHERIERR8
K5	IO_L5P_T0_34	LED_LEGACY
L4	IO_L5N_T0_34	LED_CHERI
L6	IO_L6P_T0_34	LED_HALTED
L5	IO_L2P_VREF_34	LED_BOOTOK
U6	IO_L22N_T3_34	MICROSD_CLK
V4	IO_L10N_T1_34	MICROSD_DAT0
R7	IO_L23P_T3_34	MICROSD_DAT1
V5	IO_L10P_T1_34	MICROSD_DAT2
T8	IO_L24N_T3_34	MICROSD_DAT3
R8	IO_L24P_T3_34	MICROSD_CMD
U7	R170A 33R	SDA0
V9	R170B 33R	SCL0
V7	R170C 33R	SDA1
U9	R170D 33R	SCL1
T5		NRST
I4		FPGAIO_TURBO
N5		LCD_BACKLIGHT
U3	R171 22R	RP2040_PREQ
P4		RP2040_SPARE
P3	232_TX	
N6	232_RX	
IO_L18N_T2_34		
R2	485_RO	
M4	485_DE	
N4	485_REn	
M6	485_DI	
P2	R178A 33R	MB0
R1	R178B 33R	MB1
T1	R178C 33R	MB2
U1	R178D 33R	MB3
T3	R180A 33R	MB4
V1	R180B 33R	MB5
U2	R180C 33R	MB6
V2	R180D 33R	MB7
U8	R184A 33R	MB8
T6	R184B 33R	MB9
V6	R184C 33R	MB10
R6		LCD_RST
U4		LCD_DC
R3		LCD_COPI
R5		LCD_CLK
P5		LCD_CS

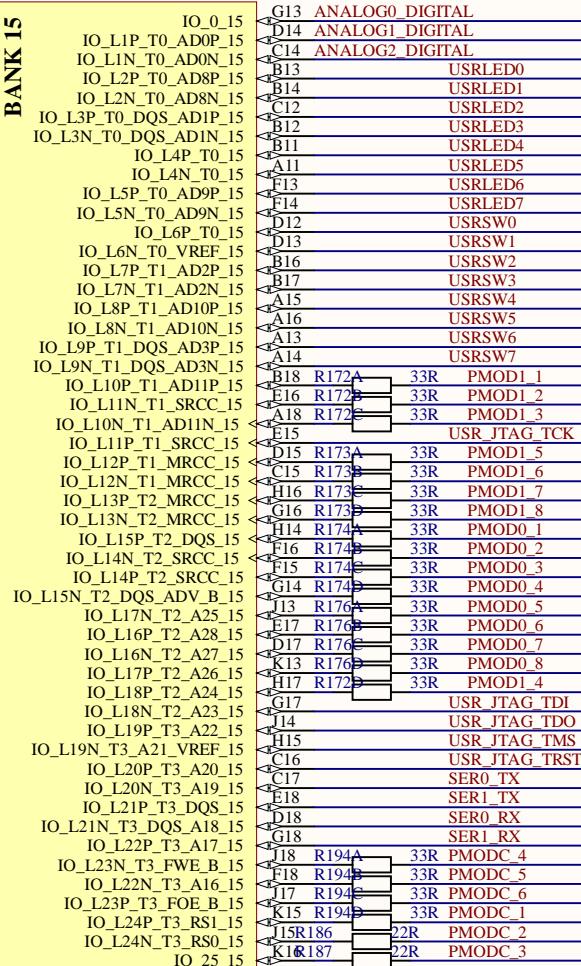
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R184D 33R



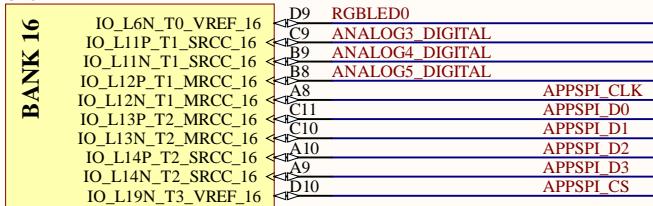
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U4B

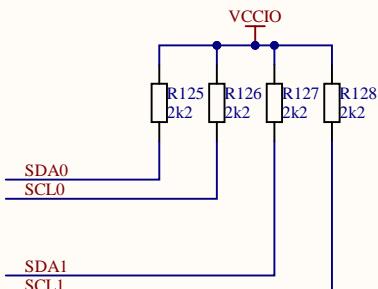


XC7A35T-1CSG324C

U4C



XC7A35T-1CSG324C



Title: IO Banks 15 + 16

Rev: 08

Project: Sonata

Approved: YES



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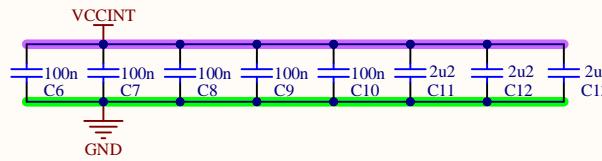
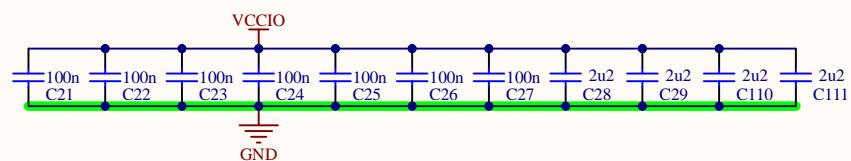
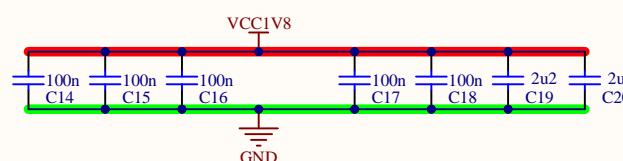
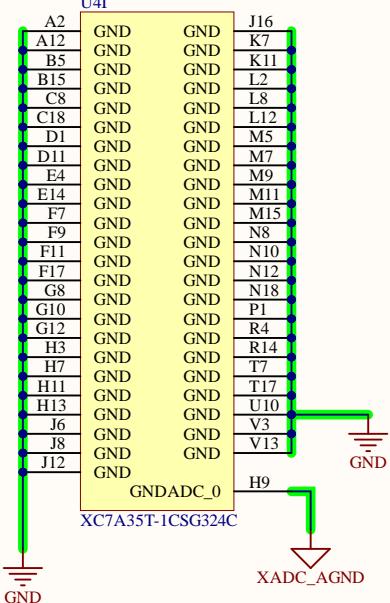
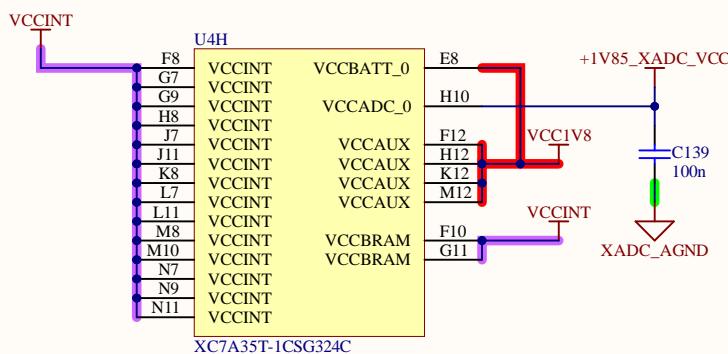
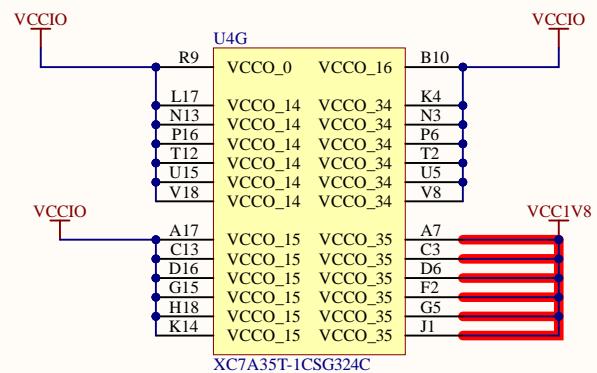
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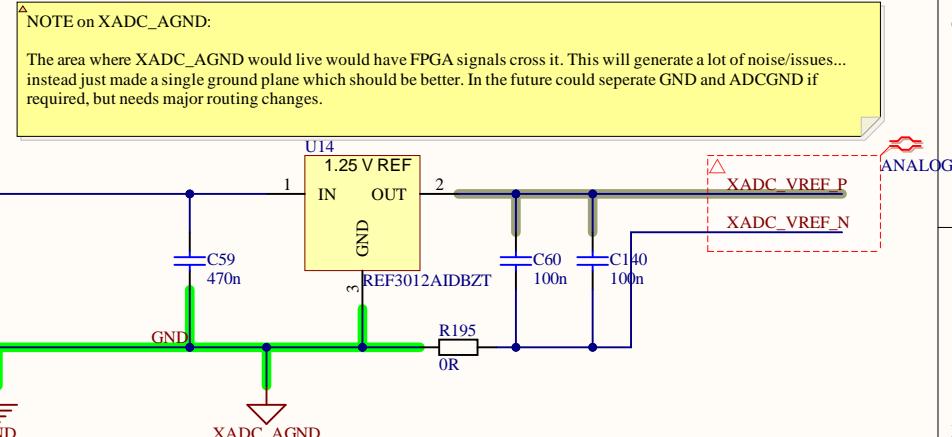
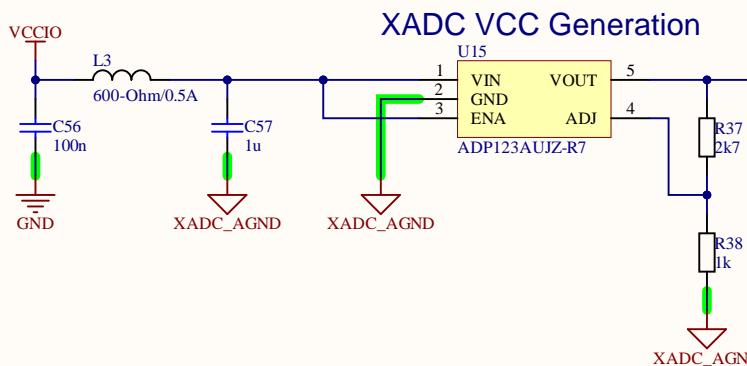
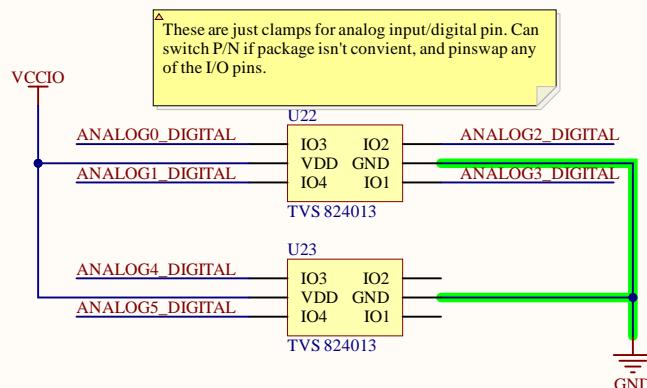
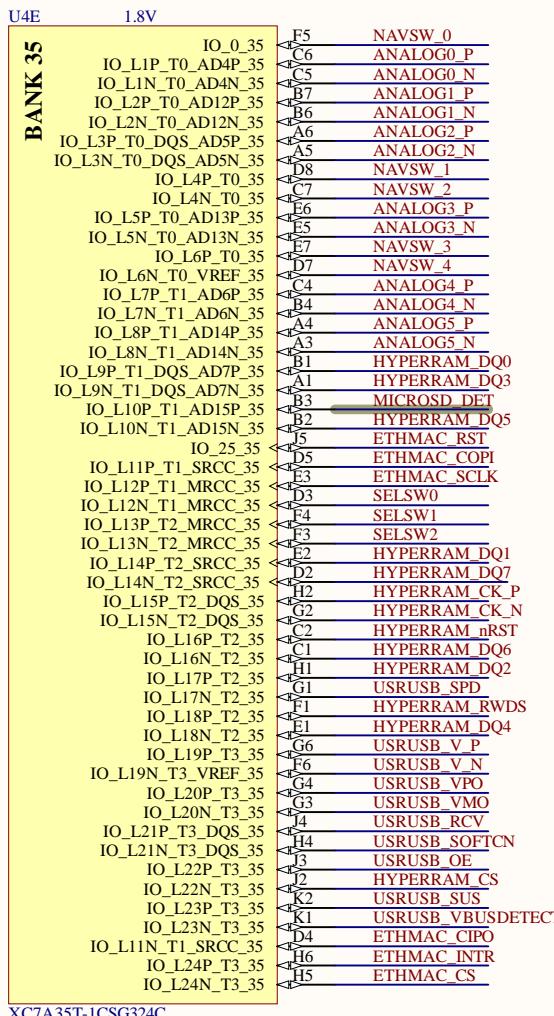
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Title: **FPGA Analog + 1.8V Bank**

Approved: YES



Rev: 08

Project: **Sonata**

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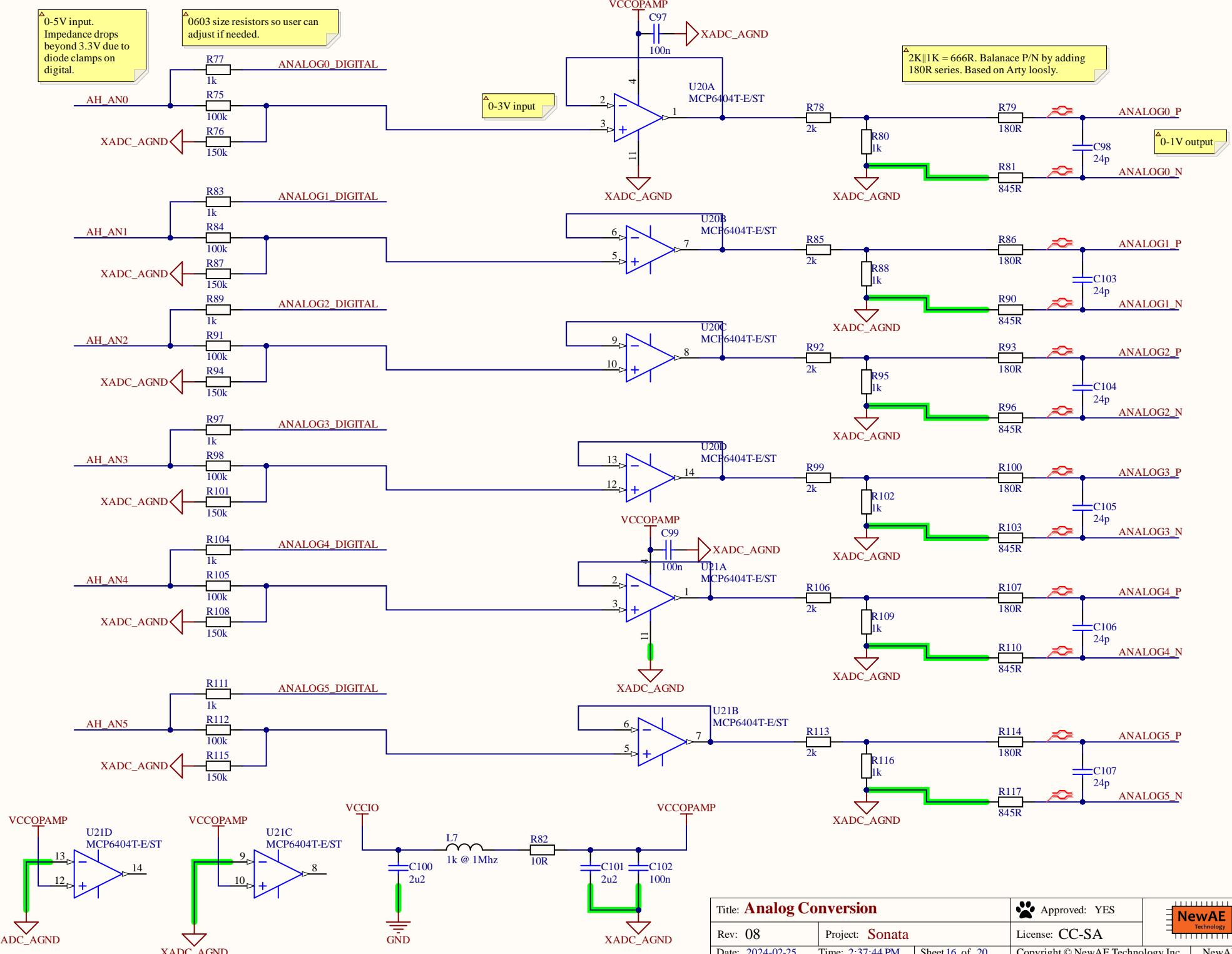
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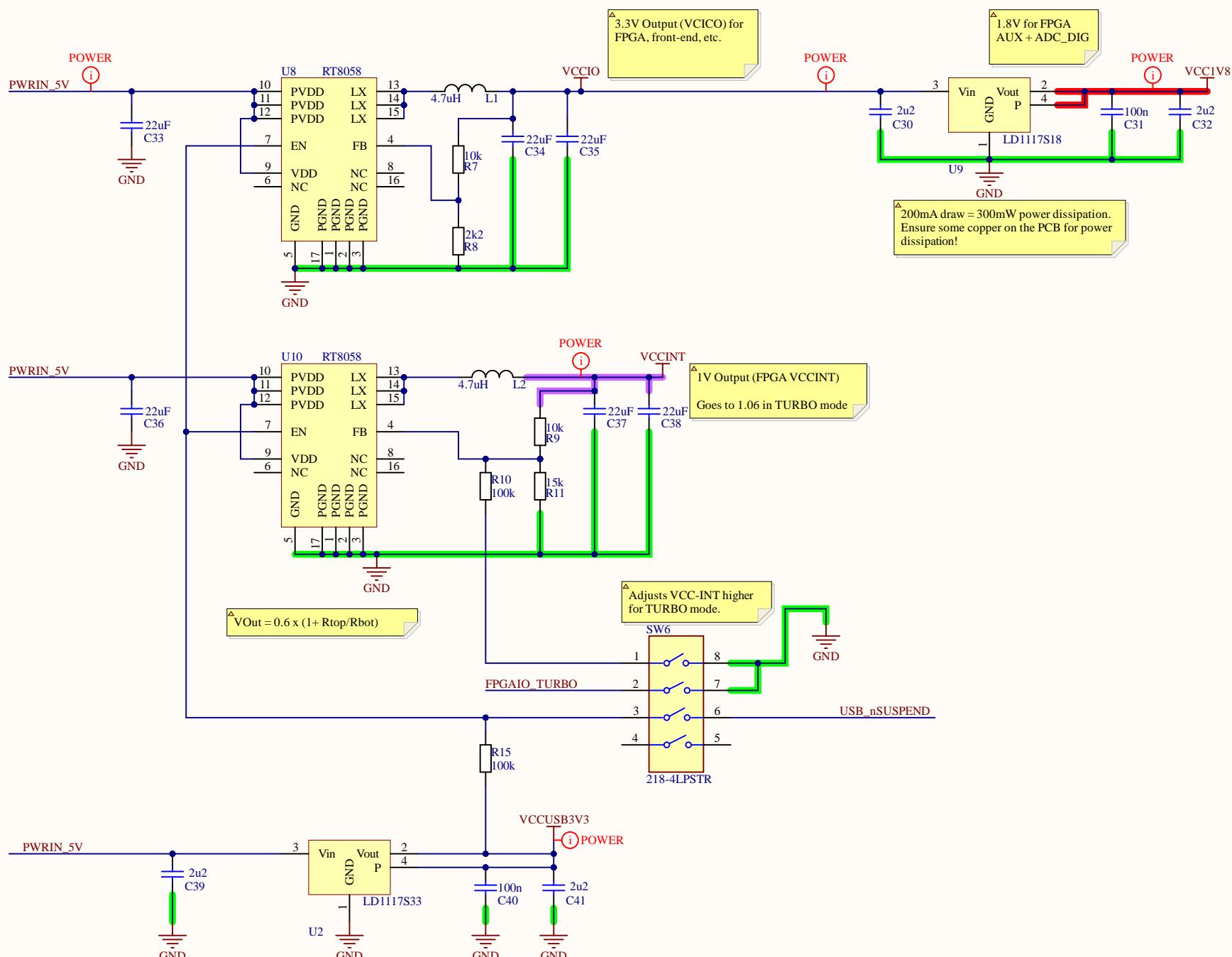
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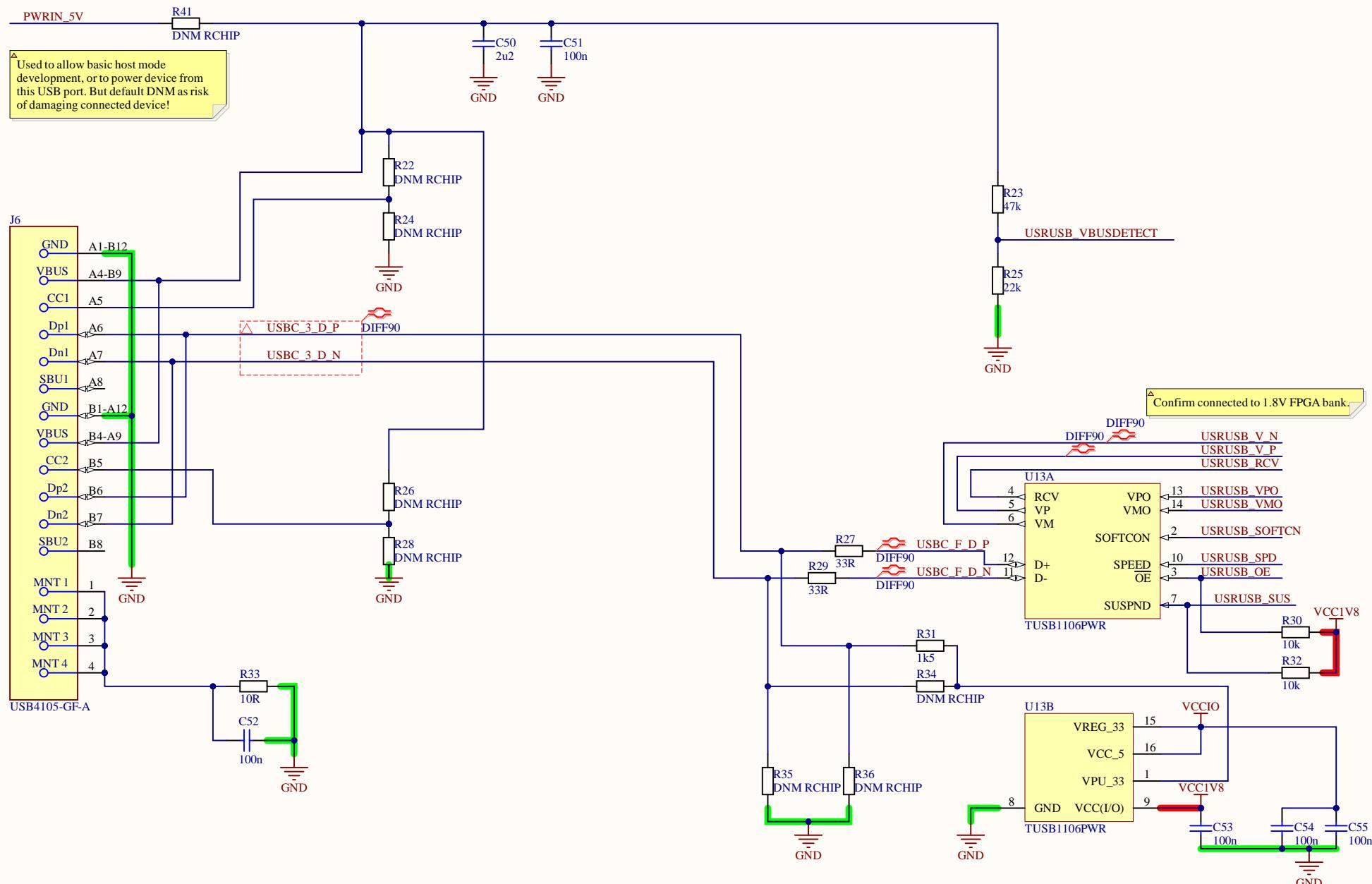
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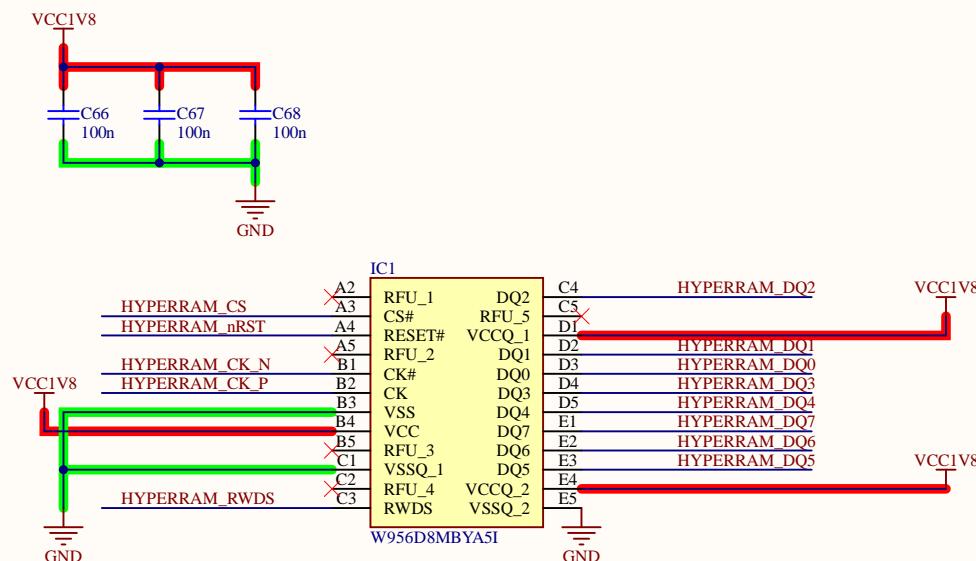
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A

A

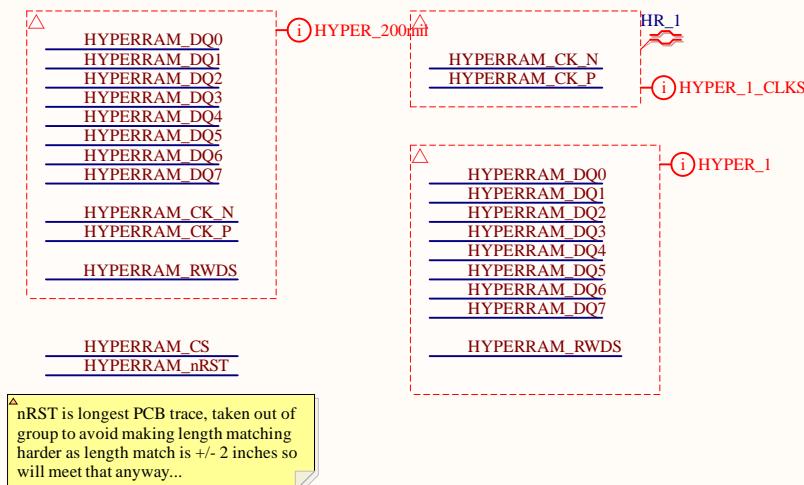


B

B

Table 5 Length matching

Signal group	Length matching tolerance
CK to CK#	±10 mils
RWDS to DQ[7:0]	±15 mils
RWDS1 to DQ[15:8] ¹	±15 mils
DQx [7:0] to DQy [7:0]	±30 mils
DQx [15:8] to DQy [15:8] ¹	
CK/CK# to DQ[7:0]	±200 mils
CK/CK# to DQ[15:0] ¹	
CK/CK# to CS#	±1500 mils
CK/CK# to RWDS	±1500 mils
RESET#/RSTO# to CS#	±2000 mils



nRST is longest PCB trace, taken out of group to avoid making length matching harder as length match is +/- 2 inches so will meet that anyway...

C

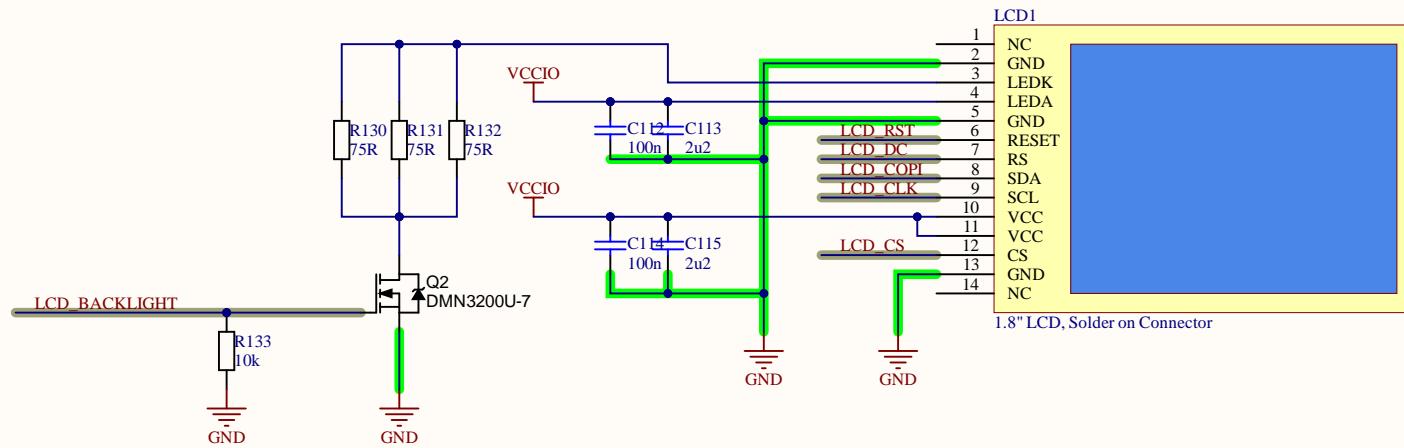
C

D

E

A

A



B

B

C

C

D

D

Title: LCD		Approved: YES	
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