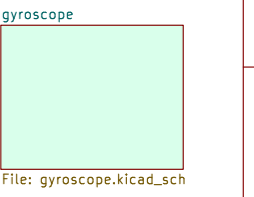
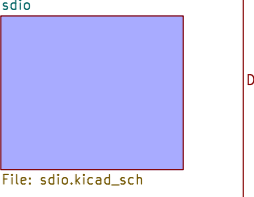
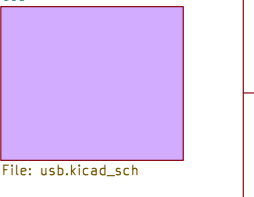
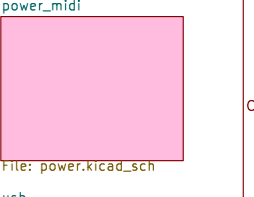
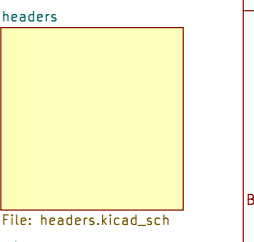
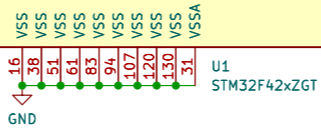


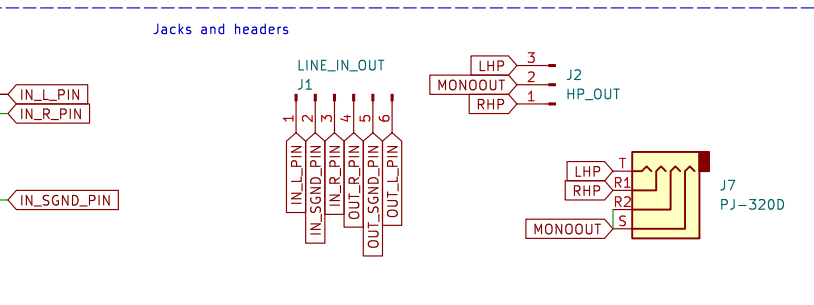
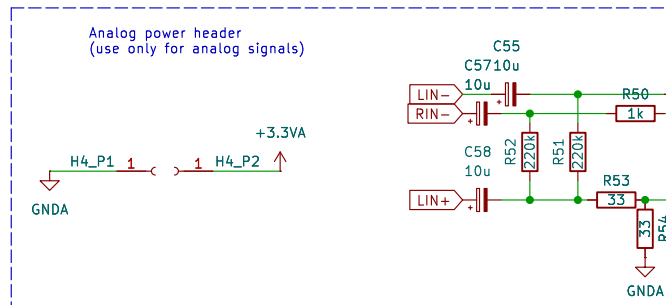
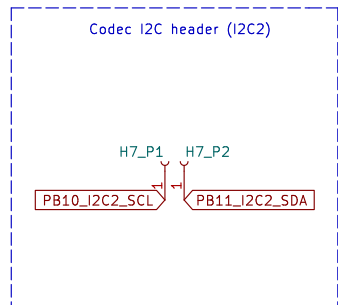
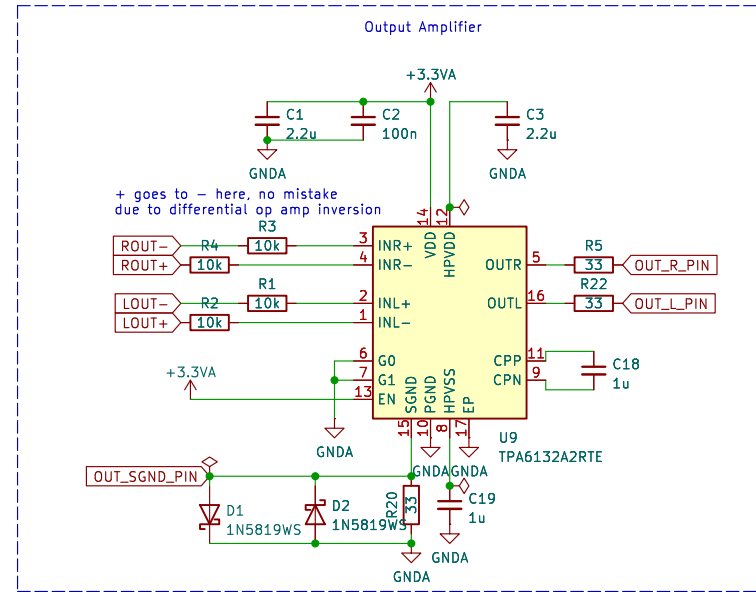
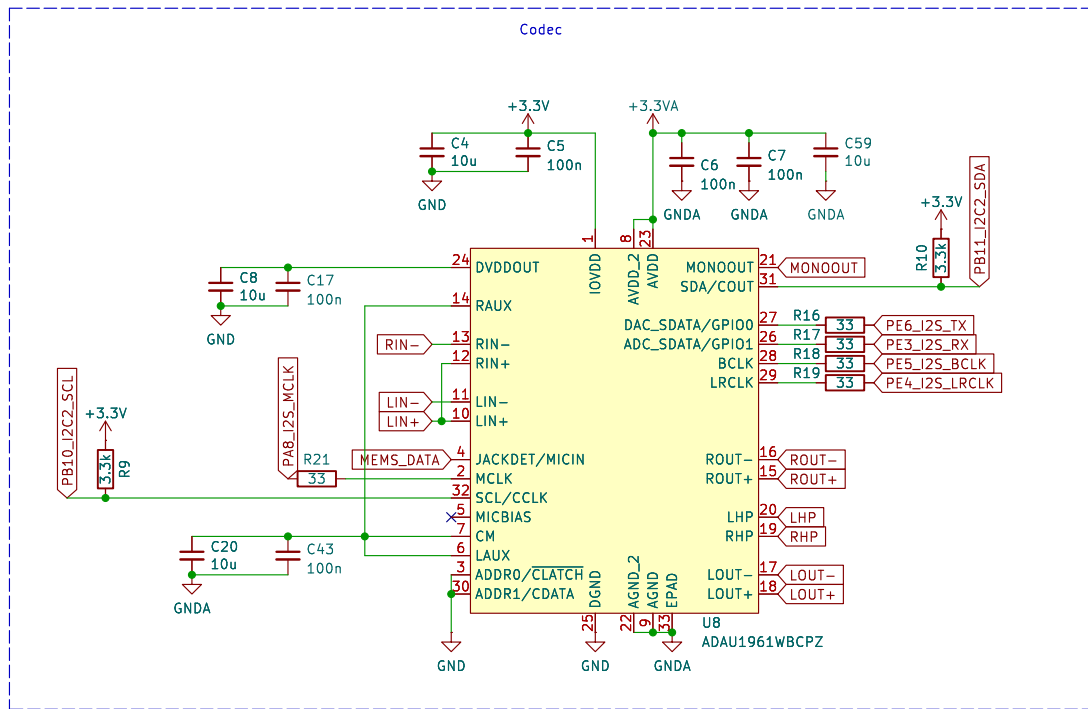
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PDR_ON	143	
BOOT0	138	PB5_BOOT0_S1
VBAT	6	
VREF+	32	
VCAP_1	71	
VCAP_2	106	
PH0	23	RCC_OSC_IN
PH1	24	RCC_OSC_OUT
PG0	56	FMC_A10
PG1	57	FMC_A11
PG2	87	FMC_A12
PG3	88	FMC_A13
PG4	89	FMC_A14   FMC_BA0
PG5	90	FMC_A15   FMC_BA1
PG6	91	DCML_D12   FMC_INT2
PG7	92	DCML_D13   FMC_INT3   USART6_CK
PG8	93	ETH_PPS_OUT   FMC_SDCLK   SPI6_NSS   USART6_RTS
PG9	124	DAC_EXTI9   DCML_VSYN   FMC_NCE3   FMC_NE2   USART6_RX
PG10	125	DCML_D2   FMC_NCE4_1   FMC_NE3
PG11	126	GPDI0
PG12	127	FMC_NE4   SPI6_MISO   USART6_RTS
PG13	128	ETH_TXD0   FMC_A24   SPI6_SCK   USART6_CTS
PG14	129	ETH_TXD1   FMC_A25   SPI6_MOSI   USART6_TX
PG15	132	FMC_CAS
PF0	10	FMC_A0   I2C2_SDA
PF1	11	FMC_A1   I2C2_SCL
PF2	12	FMC_A2   I2C2_SMBA
PF3	13	ADC3_IN9   FMC_A3
PF4	14	ADC3_IN4   FMC_A4
PF5	15	ADC3_IN15   FMC_A5
PF6	18	ADC3_IN4   FMC_NIORD   SAI1_SD_B   SPI5_NSS   TIM10_CH1   UART7_RX
PF7	19	ADC3_IN5   FMC_NREG   SAI1_MCLK_B   SPI5_SCK   TIM11_CH1   UART7_TX
PF8	20	ADC3_IN6   FMC_NIOWR   SAI1_SCK_B   SPI5_MISO   TIM13_CH1
PF9	21	ADC3_IN7   DAC_EXTI9   FMC_CD   SAI1_FS_B   SPI5_MOSI   TIM14_CH1
PF10	22	ADC3_IN8   DCML_D11   FMC_INTR
PF11	49	ADC1_EXTI11   ADC2_EXTI11   ADC3_EXTI11   DCML_D12   FMC_SDNRAS   SPI5_MOSI
PF12	50	FMC_A6
PF13	53	FMC_A7
PF14	54	FMC_A8
PF15	55	ADC1_EXTI15   ADC2_EXTI15   ADC3_EXTI15   FMC_A9
PE0	141	DCML_D2   FMC_NBL0   TIM4_ETR   UART8_RX
PE1	142	DCML_D3   FMC_NBL1   UART8_TX
PE2	1	ETH_TXD3   FMC_A23   SAI1_MCLK_A   SPI4_SCK   SYS_TRACECLK
PE3	2	FMC_A19   SAI1_SD_B   SYS_TRACED0
PE4	3	DCML_D4   FMC_A20   SAI1_FS_A   SPI4_NSS   SYS_TRACED1
PE5	4	DCML_D6   FMC_A21   SAI1_SCK_A   SPI4_MISO   SYS_TRACED2   TIM9_CH1
PE6	5	DCML_D7   FMC_A22   SAI1_SD_A   SPI4_MOSI   SYS_TRACED3   TIM9_CH2
PE7	58	FMC_D4   FMC_DA4   TIM1_ETR   UART7_RX
PE8	59	FMC_D5   FMC_DA5   TIM1_CH1N   UART7_TX
PE9	60	DAC_EXTI9   FMC_D6   FMC_DA6   TIM1_CH1
PE10	63	FMC_D7   FMC_DA7   TIM1_CH2N
PE11	64	ADC1_EXTI11   ADC2_EXTI11   ADC3_EXTI11   FMC_D8   FMC_DA8   SPI4_NSS   TIM1_CH2
PE12	65	FMC_D9   FMC_DA9   SPI4_SCK   TIM1_CH3N
PE13	66	FMC_D10   FMC_DA10   SPI4_MISO   TIM1_CH3
PE14	67	FMC_D11   FMC_DA11   SPI4_MOSI   TIM1_CH4
PE15	68	ADC1_EXTI15   ADC2_EXTI15   ADC3_EXTI15   FMC_D12   FMC_DA12   TIM1_BKIN

ADC1_IN0	ADC2_IN0	ADC3_IN0	ETH_CR5	SYS_WKUP	TIM2_CH1	TIM2_ETR	TIM5_CH1	TIM8_ETR	UART4_TX	USART2_CTS	PA0
ADC1_IN1	ADC2_IN1	ADC3_IN1	ETH_REF_CLK	ETH_RX_CLK	TIM2_CH2	TIM5_CH2	UART4_RX	USART2_RTS	PA1		
ADC1_IN2	ADC2_IN2	ADC3_IN2	ETH_MDIO	TIM2_CH3	TIM5_CH3	TIM9_CH1	USART2_TX	PA2			
ADC1_IN3	ADC2_IN3	ADC3_IN3	ETH_COL	TIM2_CH4	TIM5_CH4	TIM9_CH2	USART2_RX	PA3			
ADC1_IN4	ADC2_IN4	DAC_OUT1	DCML_HSYNCK	I2S3_WS	SPI1_NSS	SPI3_NSS	USART2_CK	USB_OTG_HS_ULPI_D0	PA4		
ADC1_IN5	ADC2_IN5	DAC_OUT2	SPI1_SCK	TIM2_CH1	TIM2_ETR	TIM8_CH1N	USB_OTG_HS_ULPI_CK	PA5			
ADC1_IN6	ADC2_IN6	DCML_PIXCK	SPI1_MISO	TIM3_CH1	TIM1_BKIN	TIM3_CH1	TIM8_BKIN	PA6			
ADC1_IN7	ADC2_IN7	ETH_CR5_DV	ETH_RX_DV	SPI1_MOSI	TIM14_CH1	TIM1_CH1N	TIM3_CH2	TIM8_CH1N	PA7		
I2C3_SCL	RCC_MCO_1	TIM1_CH1	USART1_CK	USB_OTG_FS_SOF	PA8						
DAC_EXTI9	DCML_D0	I2C3_SMBA	TIM1_CH2	USART1_TX	USB_OTG_FS_VBUS	PA9					
DCML_D1	TIM1_CH3	USART1_RX	USB_OTG_FS_ID	PA10							
ADC1_EXTI11	ADC2_EXTI11	ADC3_EXTI11	CAN1_RX	TIM1_CH4	USART1_CTS	USB_OTG_FS_DM	PA11				
CAN1_TX	TIM1_ETR	USART1_RTS	USB_OTG_FS_DP	PA12							
SYS_JTMS-SWDIO	PA13										
SYS_JTCK-SWCLK	PA14										
ADC1_EXTI15	ADC2_EXTI15	ADC3_EXTI15	I2S3_WS	SPI1_NSS	SPI3_NSS	SYS_JTDI	TIM2_CH1	TIM2_ETR	PA15		
ADC1_IN8	ADC2_IN8	ETH_RXD2	TIM1_CH2N	TIM3_CH3	TIM8_CH2N	USB_OTG_HS_ULPI_D1	PB0				
ADC1_IN9	ADC2_IN9	ETH_RXD3	TIM1_CH3N	TIM3_CH4	TIM8_CH3N	USB_OTG_HS_ULPI_D2	PB1				
I2S3_CK	SPI1_SCK	SPI3_SCK	SYS_JTDO-SW0	TIM2_CH2	PB3						
I2S3_ext_SD	SPI1_MISO	SPI3_MISO	SYS_JTRST	TIM3_CH1	PB4						
CAN2_RX	DCML_D10	ETH_PPS_OUT	FMC_SDCKE1	I2C1_SMBA	I2S3_SD	SPI1_MOSI	SPI3_MOSI	TIM3_CH2	USB_OTG_HS_ULPI_D7	PB5	
CAN2_TX	DCML_D5	FMC_SDNE1	I2C1_SCL	TIM4_CH1	USART1_TX	PB6					
DCML_VSYNCK	FMC_NL	I2C1_SDA	TIM4_CH2	USART1_RX	PB7						
CAN1_RX	DCML_D6	ETH_TXD3	I2C1_SCL	SDIO_D4	TIM10_CH1	TIM4_CH3	PB8				
CAN1_TX	DAC_EXTI9	DCML_D7	I2C1_SDA	I2S2_WS	SDIO_D5	SPI2_NSS	TIM11_CH1	TIM4_CH4	PB9		
ETH_RX_ER	I2C2_SCL	I2S2_CK	TIM2_CH3	USART3_TX	USB_OTG_HS_ULPI_D3	PB10					
ADC1_EXTI11	ADC2_EXTI11	ADC3_EXTI11	ETH_TX_EN	I2C2_SDA	TIM2_CH4	USART3_RX	USB_OTG_HS_ULPI_D4	PB11			
CAN2_RX	I2C2_SMBA	I2S2_WS	SPI2_NSS	TIM1_BKIN	USART3_CK	USB_OTG_HS_ID	USB_OTG_HS_ULPI_D5	PB12			
CAN2_TX	ETH_TXD1	I2S2_CK	SPI2_SCK	TIM1_CH1N	USART3_CTS	USB_OTG_HS_ULPI_D6	USB_OTG_HS_VBUS	PB13			
I2S2_ext_SD	SPI2_MISO	TIM12_CH1	TIM1_CH2N	TIM8_CH2N	USART3_RTS	USB_OTG_HS_DM	PB14				
ADC1_EXTI15	ADC2_EXTI15	ADC3_EXTI15	I2S2_SD	RTC_REFIN	SPI2_MOSI	TIM12_CH2	TIM1_CH3N	TIM8_CH3N	USB_OTG_HS_DP	PB15	
ADC1_IN10	ADC2_IN10	ADC3_IN10	FMC_SDNWE	USB_OTG_HS_ULPI_STP	PC0						
ADC1_IN11	ADC2_IN11	ADC3_IN11	ETH_MDC	PC1							
ADC1_IN12	ADC2_IN12	ADC3_IN12	ETH_TXD2	FMC_SDNE0	I2S2_ext_SD	SPI2_MISO	USB_OTG_HS_ULPI_DIR	PC2			
ADC1_IN13	ADC2_IN13	ADC3_IN13	ETH_TX_CLK	FMC_SDCKE0	I2S2_SD	SPI2_MOSI	USB_OTG_HS_ULPI_NXT	PC3			
ADC1_IN14	ADC2_IN14	ETH_RXD0	PC4								
ADC1_IN15	ADC2_IN15	ETH_RXD1	PC5								
DCML_D0	I2S2_MCK	SDIO_D6	TIM3_CH1	TIM8_CH1	USART6_TX	PC6					
DCML_D1	I2S3_MCK	SDIO_D7	TIM3_CH2	TIM8_CH2	USART6_RX	PC7					
DCML_D2	I2S3_CK	SDIO_D0	TIM3_CH3	TIM8_CH3	USART6_CK	PC8					
DAC_EXTI9	DCML_D3	I2C3_SDA	I2S3_CKIN	RCC_MCO_2	SDIO_D1	TIM3_CH4	TIM8_CH4	PC9			
DCML_D8	I2S3_CK	SDIO_D2	SPI3_SCK	UART4_TX	USART3_TX	PC10					
ADC1_EXTI11	ADC2_EXTI11	ADC3_EXTI11	DCML_D4	I2S3_ext_SD	SDIO_D3	SPI3_MISO	UART4_RX	USART3_RX	PC11		
DCML_D9	I2S3_SD	SDIO_CK	SPI3_MOSI	UART5_TX	USART3_CK	PC12					
RTG_AF11	PC13										
REG_O5632-IN	PC14										
ADC1_EXTI15	ADC2_EXTI15	ADC3_EXTI15	REG_O5632-OUT	PC15							
CAN1_RX	FMC_D2	FMC_DA2	PD0								
CAN1_TX	FMC_D3	FMC_DA3	PD1								
DCML_D11	SDIO_CMD	TIM3_ETR	UART5_RX	PD2							
DCML_D5	FMC_CLK	I2S2_CK	SPI2_SCK	USART2_CTS	PD3						
FMC_NOE	USART2_RTS	PD4									
FMC_NWE	USART2_TX	PD5									
DCML_D10	FMC_NWAIT	I2S3_SD	SAI1_SD_A	SPI3_MOSI	USART2_RX	PD6					
FMC_NCE2	FMC_NE1	USART2_CK	PD7								
FMC_D13	FMC_DA13	USART3_TX	PD8								
DAC_EXTI9	FMC_D14	FMC_DA14	USART3_RX	PD9							
FMC_D15	FMC_DA15	USART3_CK	PD10								
ADC1_EXTI11	ADC2_EXTI11	ADC3_EXTI11	FMC_A16	FMC_CLE	USART3_CTS	PD11					
FMC_A17	FMC_ALE	TIM4_CH1	USART3_RTS	PD12							
FMC_A18	TIM4_CH2	PD13									
FMC_D0	FMC_DA0	TIM4_CH3	PD14								
ADC1_EXTI15	ADC2_EXTI15	ADC3_EXTI15	FMC_D1	FMC_DA1	TIM4_CH4	PD15					



change1og	CHANGELOG
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Size: A3	Date: 2025-03-24	Rev: v0.7
KiCad E.D.A. 8.0.6	Id: 1/9	



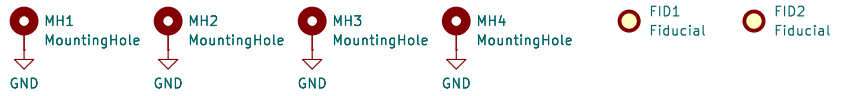
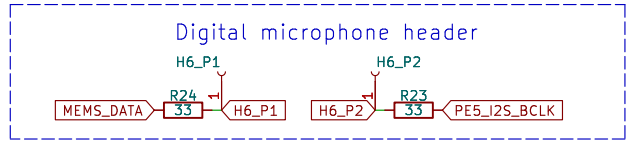
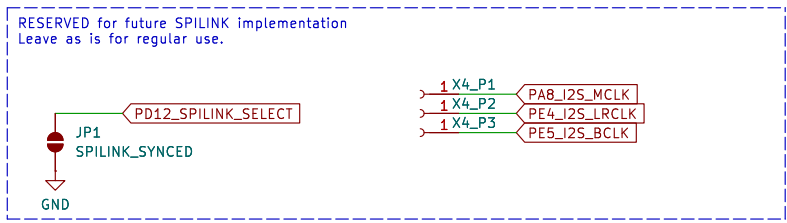
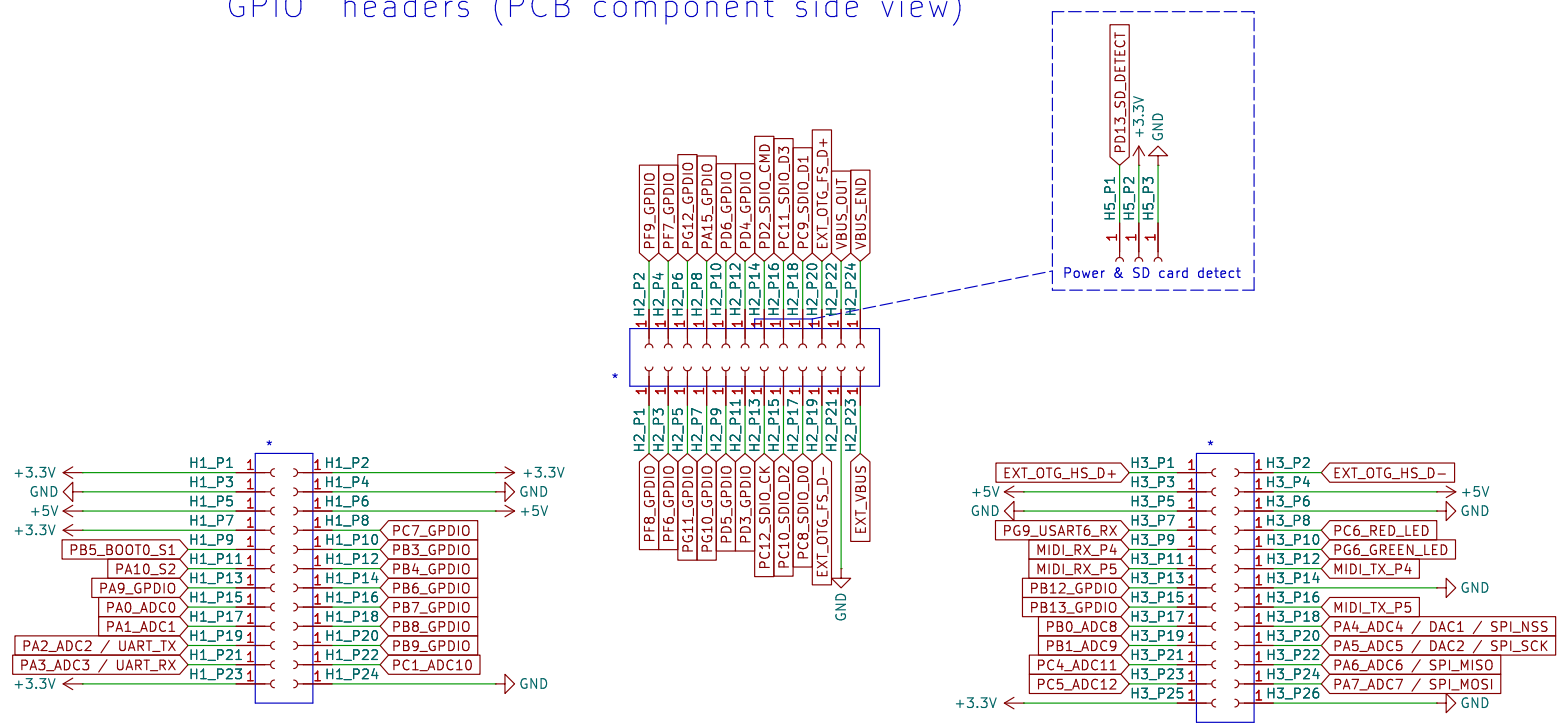
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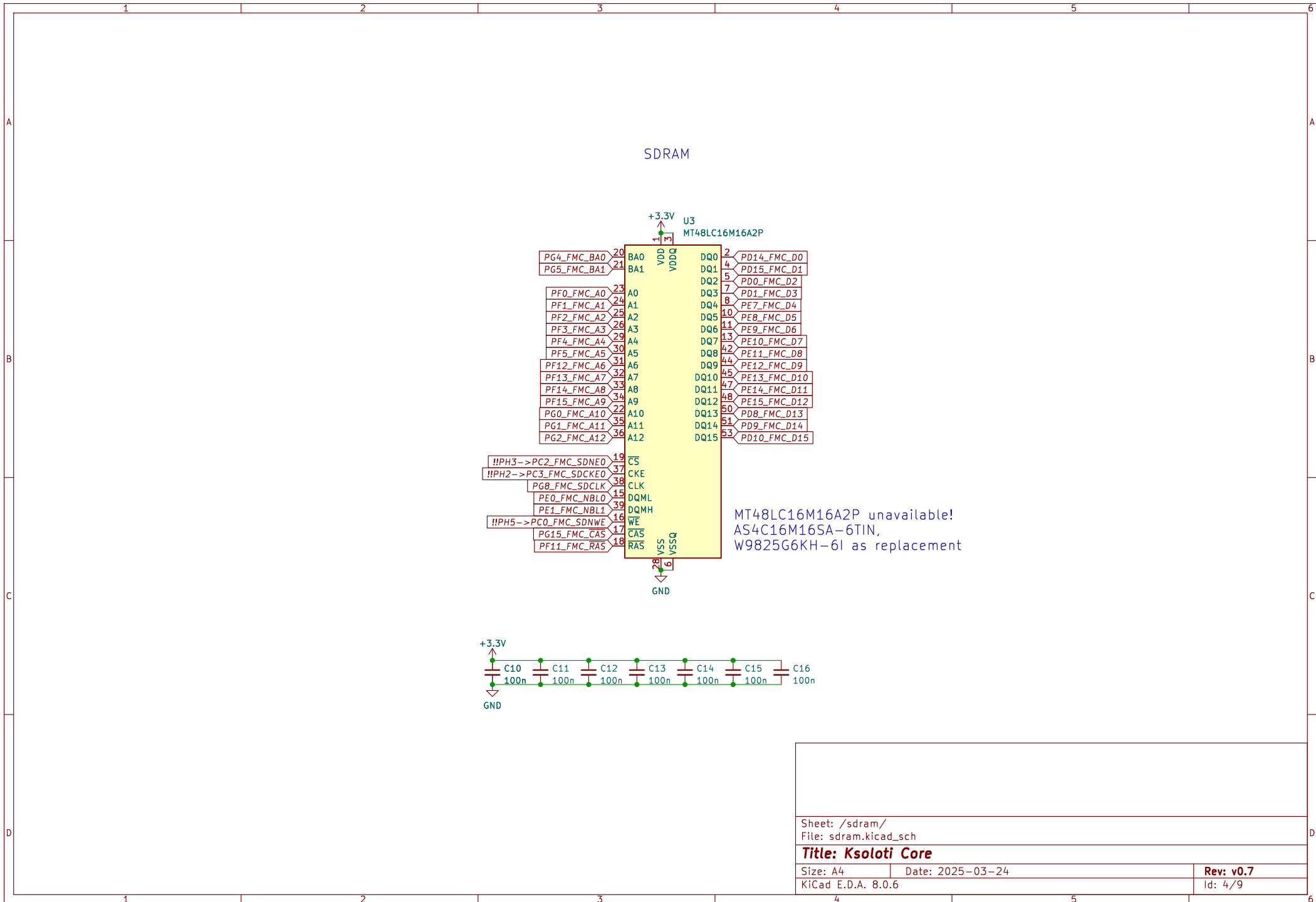
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KiCad E.D.A. 8.0.6

Rev: v0.7  
Id: 2/9

# "GPIO" headers (PCB component side view)



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KiCad E.D.A. 8.0.6	Rev: v0.7 Id: 3/9

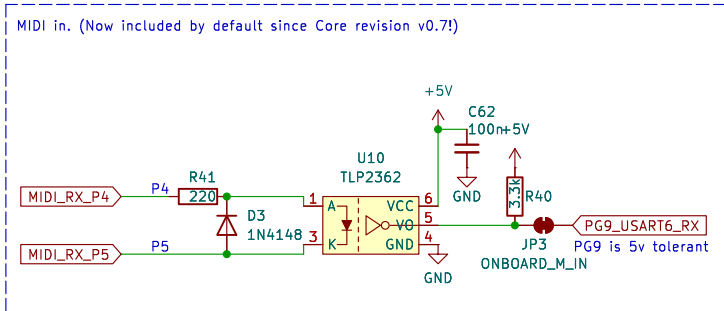


SDRAM

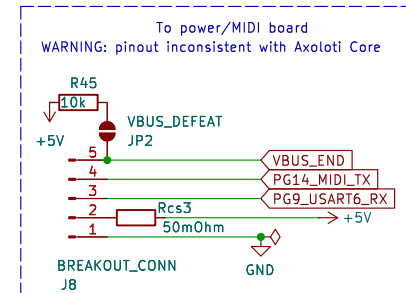
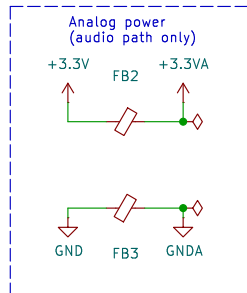
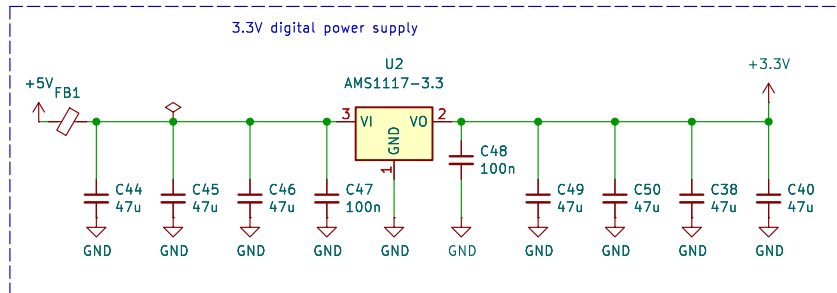
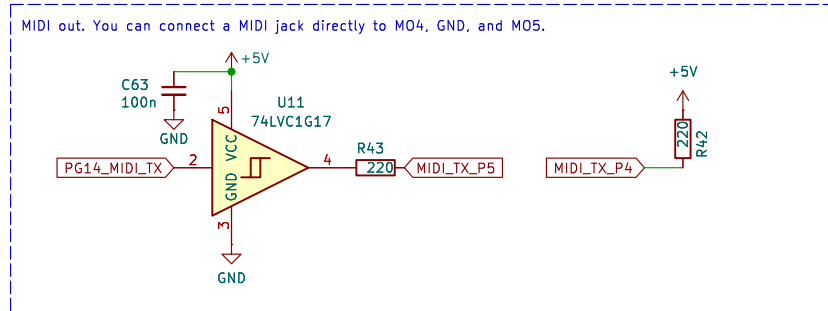
U3  
MT48LC16M16A2P

MT48LC16M16A2P unavailable!  
AS4C16M16SA-6TIN,  
W9825G6KH-6I as replacement

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Size: A4	Date: 2025-03-24
KiCad E.D.A. 8.0.6	Rev: v0.7
	Id: 4/9



JP3 is closed by default, enabling the onboard MIDI input circuit. If you use an external MIDI input circuit connected to PG9\_USART6\_RX and encounter MIDI input problems, you may need to cut JP3 to free PG9.



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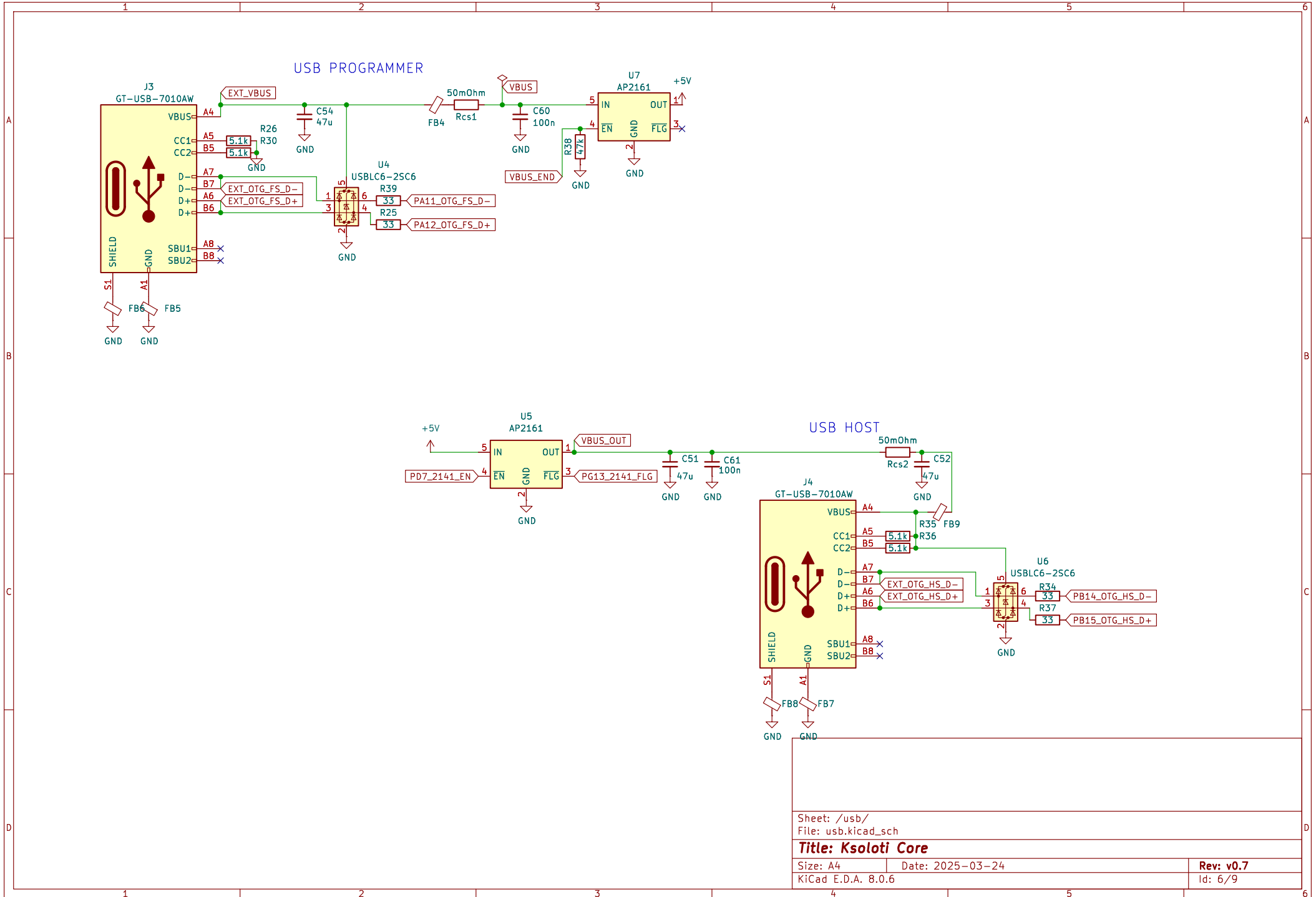
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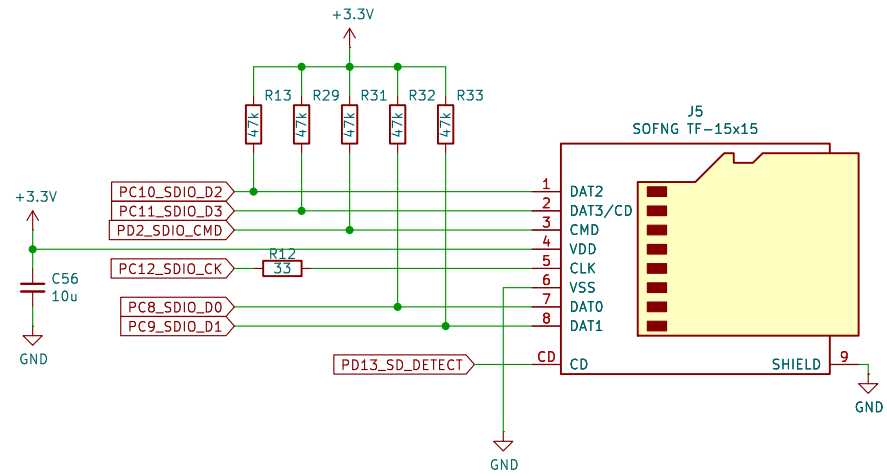
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Rev: v0.7

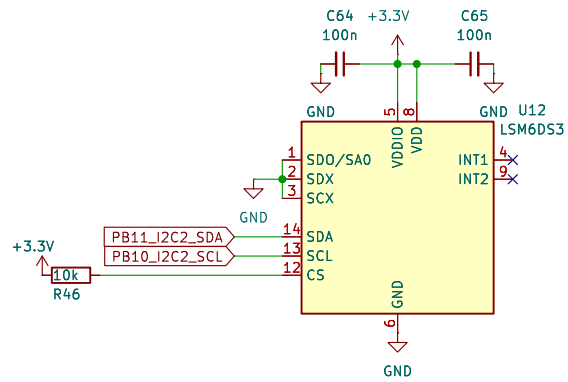
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Micro SD card



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KiCad E.D.A. 8.0.6	Rev: v0.7
	Id: 7/9



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Size: A4	KiCad E.D.A. 8.0.6		Id: 8/9



**v0.1 done -- prototype ordered 2023/04/13**

**v0.2 done -- prototype ordered 2023/04/26**

Changes in v0.2:

- (even) higher series resistors for LEDs
- break out PA15 as GPDIO17, PD3 as GPDIO18
- combine S1/BOOT0 pin and GPDIO2 (PB5)
- untent some vias to make them usable as test points
- move SD card slot to make space for mounting hole
- add fiducials and M2.5 mounting holes
- add footprint for SMD 3.5mm headphone jack (PJ-320D) on bottom
- add digital PDM microphone connected to SPI3 (I2S3)
- pull PG3 up to VDD to have a way in firmware to check board version
- change HP output pinout so that it matches line out. One thing less that could go wrong!

**v0.3 done -- prototype ordered 2023/06/21**

Changes in v0.3:

- Break out PA9 as GPDIO19, PC7 as GPDIO20, PB12 as GPDIO21, PB13 as GPDIO22 (was running out of PWMable and general digital pins)
- Increase capacitors on 5V rail (3.3V regulator input) and 3.3V output to avoid MCU reset due to power drop when connecting external 5V while core is powered via USB.
- Connect both physical legs of each SMD switch to their respective nets (not just to one physical leg of each side)
- Increase mounting holes to M3, squeeze in two more mounting holes - total 4 now
- Modify footprints of electrolytic caps so that they can alternatively accommodate 1206 ceramic caps
- Remove via "untent" test points - they were creating risks when hand soldering ICs
- Reroute PDM mic to interface directly with the codec. Now the codec can be setup in your patch to take either the mono mic or the stereo line in as input.
- Add expansion header for optional second digital microphone
- Move power-midi board connector J11 north by 2.54mm (to align with new power-midi board)
- Revise ferrite beads (some unnecessary)
- Revise 3.3V versus 3.3VA (3.3VA and GND now reserved for audio and codec only, 3.3V and GND for digital and now also for STM32 ADC/DAC), add dedicated pins for 3.3VA and GND in the codec section, should they be required.
- Add H3\_P25 and H3\_P26 so that 3.3V is available on the right header.
- Make 5V available on the left header.
- Add current sensing resistors to 5V in, USB port in, and USB host out, to be able to measure current requirements.
- Add MIDI out circuit. MIDI output can now be used out of the box by connecting a connector to the header.
- Add optional MIDI in circuit on the back side of the PCB. Users can solder the respective parts and get MIDI input by soldering a DIN or TRS connector to the header.

**v0.4 done -- prototype ordered 2023/08/11**

Changes in v0.4:

- Change R43 (MIDI out) from 220R to 100R.
- Adjust 3.3V zone around U2 (3.3V regulator).
- Adjust keepout zone around Y1 (8Mhz crystal).
- Move USB sockets north by 0.5mm to let them poke through panels. Note that this will increase overall Y-dimension of the board to ca. 90mm.
- Add SPILINK master/sync jumper (JP1) and "Multiprocessor Sync" header (X4). RESERVED for future SPILINK implementation. Leave as is for regular use.
- Change header pinout so that related pins are next to each other:
  - \* H3: Move SD card pins together. Move PF6..9 pins so that they are together with the other GPDIO pins.
  - \* Move MIDI-related pins together.
  - \* Move SW1, SW2 position and header pins together.
  - \* Align pins in order where possible (PA0..3, PA4..7 etc.)
- Add 10k pull-down resistor to Switch 2.

**v0.5 done -- 2023/09/22**

Changes in v0.5:

- Remove PDM mic, add optional gyroscope/accelerometer via I2C2.
- Rename MIDI pins to Mx, MOx.
- Fix swapped labeling of LED1 and LED2 to conform with Axo tradition. Rename LED pins to L1G and L2R to indicate color.
- Add 47uF caps C38, C40 to 3.3V rail for more stability when USB or external power is (accidentally) unplugged

**v0.6 done -- 2024/03/06**

Changes in v0.6:

- In USB host port, use AP2161 instead of AP2141 to allow for up to 1A of current.
- MT48LC16M16A2P (SDRAM) part shortage. Use AS4C16M16SA-6TIN (W9825G6KH-6I; IS42S16160J-6TLI?)
- SRV05-4 price fluctuation. Use USBLC6-2SC6.
- Add jumper to disable VBUS power (useful if powered by other Core via SPILink)
- Remove gyroscope (feature creep)
- Change layer sequence - SDRAM lines now run on inner layer.
- Realign R42, R43 (MIDI out circuit)
- Improve MI4, MI5, optional MIDI in circuit labeling
- Adjust USB Type-C connector footprint
- Use TLP2362 as optional optocoupler (smaller footprint)
- Add ferrites to USB GND

**v0.7 done -- 2025/02/21**

Changes in v0.7:

- Move (previously optional) MIDI in circuit to top layer, include in assembly. Add jumper ONBOARD\_M\_IN, closed by default
- Reroute USB lines to headers so they include spike protection, rename RAW\_\* to EXT\_\* to indicate that external USB signals connect there
- Add Schmitt Trigger shifting the MIDI OUT signal up to 5V, providing bullet-proof MIDI OUT to any weak-input device you may encounter!
- Add gyroscope back (hooked up to on-board I2C2 bus shared with ADAU1961 codec)
- Remove 220 Ohm series resistors on I2C2 lines (unnecessary, signal can be tweaked via I2C peripheral), add I2C2 header pins

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