[1] Power

File: power.kicad_sch

[2] MCU

File: mcu.kicad_sch

[3] ADC

SPI_CLK
SPI_ NCS
SPI_MISO

File: adc.kicad_sch

[4] DAC

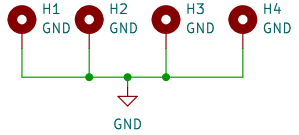
SPI_CLK
SPI_MOSI
SPI_NCS
DAC_NLDAC
DAC_NCLR

File: dac.kicad_sch

ADC_SPI1_CLK
ADC_SPI1_NCS
ADC_SPI1_MISO

DAC_SPI0_CLK
DAC_SPI0_MOSI
DAC_SPI0_NCS
DAC_NLDAC
DAC_NCLR

Mounting Holes (M3)



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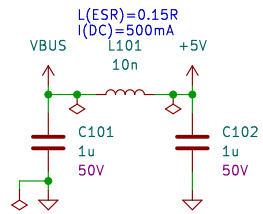
LP

Sheet: /
File: rp2040_audioboard.kicad_sch

Title: RP2040 Audio Board

Size: A4	Date: 2023-05-01	**Rev: 0.2**
KiCad E.D.A. kicad (7.0.0)		Id: 1/5

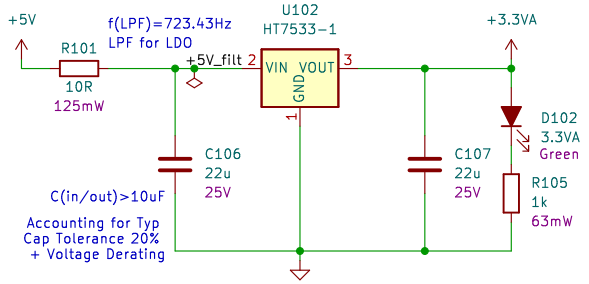
Input Filter



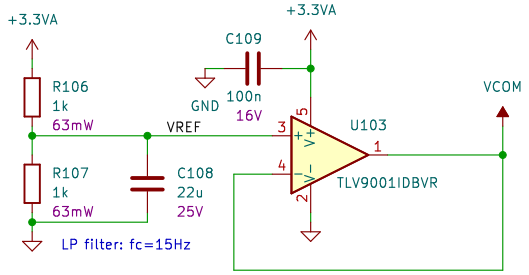
VBUS power comes from USB Type C Connector

3.3V Analog Supply (LDO)

* Vin(MAX)=5V
* Iout(MAX)=100mA



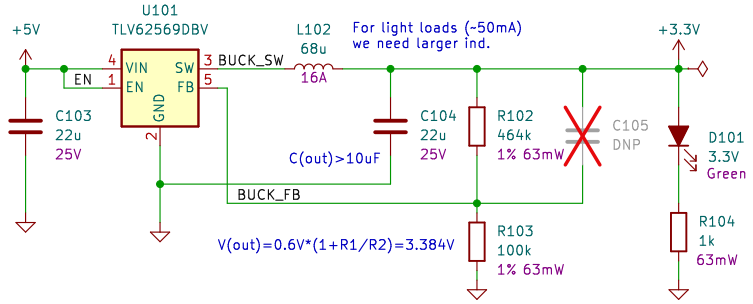
Bias Generator



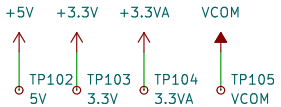
3.3V Digital Supply (BUCK)

* Vin(MAX)=5V
* Iout(MAX)=250mA
* f(sw)=1.5MHz

L(ILoadmax)= Vo(Vi-Vo) / dIL*f(sw)*Vi
= 3.3(5-3.3) / 0.25*Iload(max)*1.5e6*5
= 3.3(5-3.3) / 0.25*0.25*1.5e6*5
= 12uH -> next size 15uH



Test Points



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LP

Sheet: /[1] Power/
File: power.kicad_sch

Title: RP2040 Audio Board

Size: A4	Date: 2023-05-01	**Rev: 0.1**
KiCad E.D.A. kicad (7.0.0)		Id: 2/5

MCU (RP2040)

Make sure 1u caps are close to pin 44 (VREG_IN) & 45 (VREG_OUT)

+1V1

C203 100n 16V
C204 100n 16V
C205 1u 50V

+3.3V

C206 1u 50V
C207 100n 16V
C208 100n 16V
C209 100n 16V
C210 100n 16V
C211 100n 16V
C212 100n 16V
C213 100n 16V

+3.3V

R213 63mW 10k
RUN 26

USB_D+ 27
USB_D- 27
R201 63mW USB_DT+ 47
R202 63mW USB_DT- 46
USB_DP
USB_DM

QSPI_CS 56
QSPI_SS

QSPI_SD0 53
QSPI_SD1 55
QSPI_SD2 54
QSPI_SD3 51
QSPI_SCLK 52
QSPI_SD0
QSPI_SD1
QSPI_SD2
QSPI_SD3
QSPI_SCLK

XIN 20
XIN

CL = 20pF
R203 63mW 1k
XOUT 21
XOUT
Y201
CR_XOUT

SWCLK 24
SWDIO 25
SWCLK
SWD

TESTEN 19

C201 30pF 5% 50V
C202 30pF 5% 50V

U201
RP2040

VREG_VOUT 45
DVDD 23
IOVDD 1
USB_VDD 48
ADC_AVDD 43
VREG_IN 44
GND 57

GPIO0 2
GPIO1 3
GPIO2 4
GPIO3 5
GPIO4 6
GPIO5 7
GPIO6 8
GPIO7 9
GPIO8 11
GPIO9 12
GPIO10 13
GPIO11 14 ACT_LED
GPIO12 15
GPIO13 16
GPIO14 17
GPIO15 18
GPIO16 27
GPIO17 28
GPIO18 29 ADC_SPI1_CLK
GPIO19 30
GPIO20 31 ADC_SPI1_MISO
GPIO21 32 ADC_SPI1_NCS
GPIO22 34 DAC_SPI0_CLK
GPIO23 35 DAC_SPI0_MOSI
GPIO24 36
GPIO25 37 DAC_SPI0_NCS
GPIO26_ADC0 38 DAC_NLDAC
GPIO27_ADC1 39 DAC_NCLR
GPIO28_ADC2 40
GPIO29_ADC3 41

Reset, Bootsel, LEDS

RUN
SW201 RESET
R209 1k 63mW

QSPI_CS
SW202 BOOTSEL
R210 1k 63mW

ACT_LED
D205 Act Green
R211 1k 63mW

QSPI Flash

+3.3V

R212 DNP 10k

C216 1u 50V
C217 100n 16V

QSPI_CS 1
QSPI_SCLK 6
QSPI_SD0 5
QSPI_SD1 2
QSPI_SD2 3
QSPI_SD3 7

CS
CLK
DI(IO0)
DO(IO1)
IO2
IO3
VCC 8
GND 4

U203
W25Q128JVS

USB Type C

J202
USB_C_Receptacle_USB2.0

VBUS
A4 VBUS

A5 USB_CONN_CC1
B5 USB_CONN_CC2
CC1
CC2
R207 63mW 5k1
R208 63mW 5k1

A7 D-
B7 D-
A6 D+
B6 D+
USB_CONN_D-
USB_CONN_D+

SHIELD
GND
A8 SBU1
B8 SBU2
S1
A1

C215 100n
VBUS
U202
USBLC6-2SC6

USB_CMC_D- 6
USB_CONN_D- 1
4 USB_CMC_D+
3 USB_CONN_D+

CMF3216F-900-2P-T
USB_CMC_D- 1
4 USB_D-
USB_CMC_D+ 2
3 USB_D+
L201
Common-Mode Choke Impedance: 90R

Signal Path:
Connector <-> ESD Protection <-> Common-Mode Choke <-> Pull-Up <-> MCU

SWD Header

+3.3V
J201
2x5 1.27mm

CONN_SWDIO R204 63mW 49R9 SWDIO
CONN_SWCLK R205 63mW 49R9 SWCLK
CONN_NRST R206 63mW 49R9 RUN

D201 PESD3V3L1BA
D202
D203
D204
PESD3V3L1BA
C214 100n 16V

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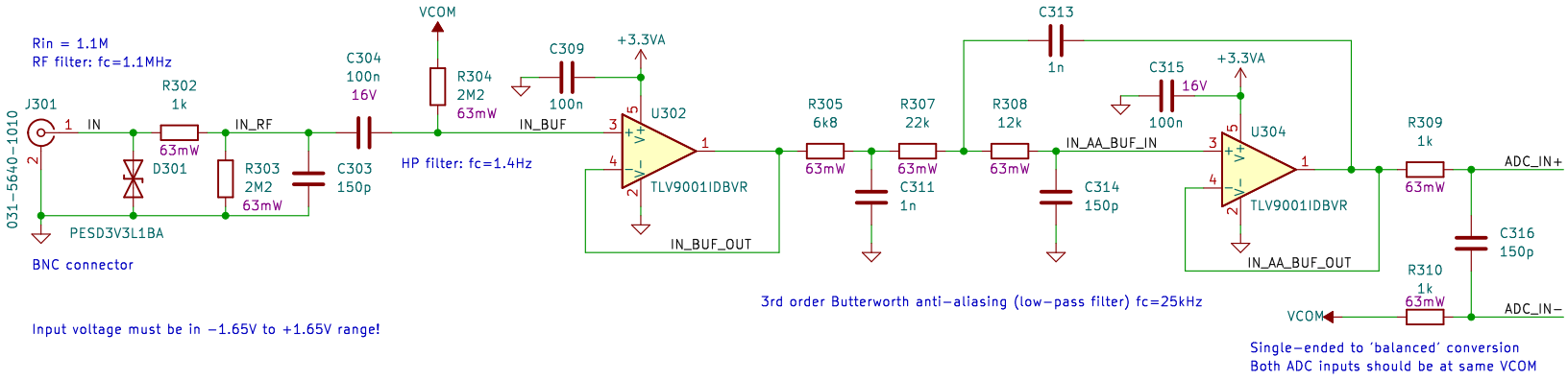
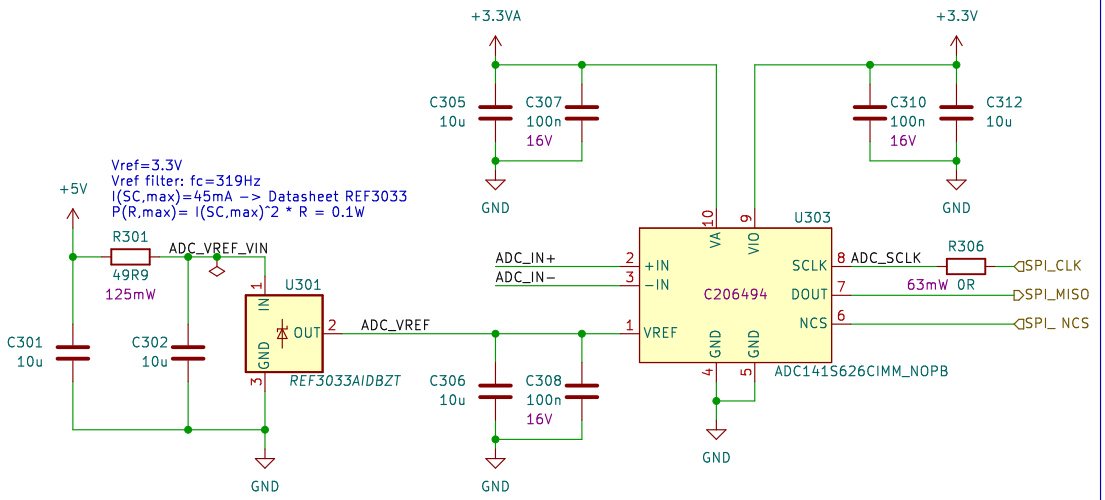
LP
Sheet: /[2] MCU/
File: mcu.kicad_sch
Title: RP2040 Audio Board
Size: A4 | Date: 2023-05-01 | **Rev: 0.2**
KiCad E.D.A. kicad (7.0.0) | Id: 3/5

Analog Front End

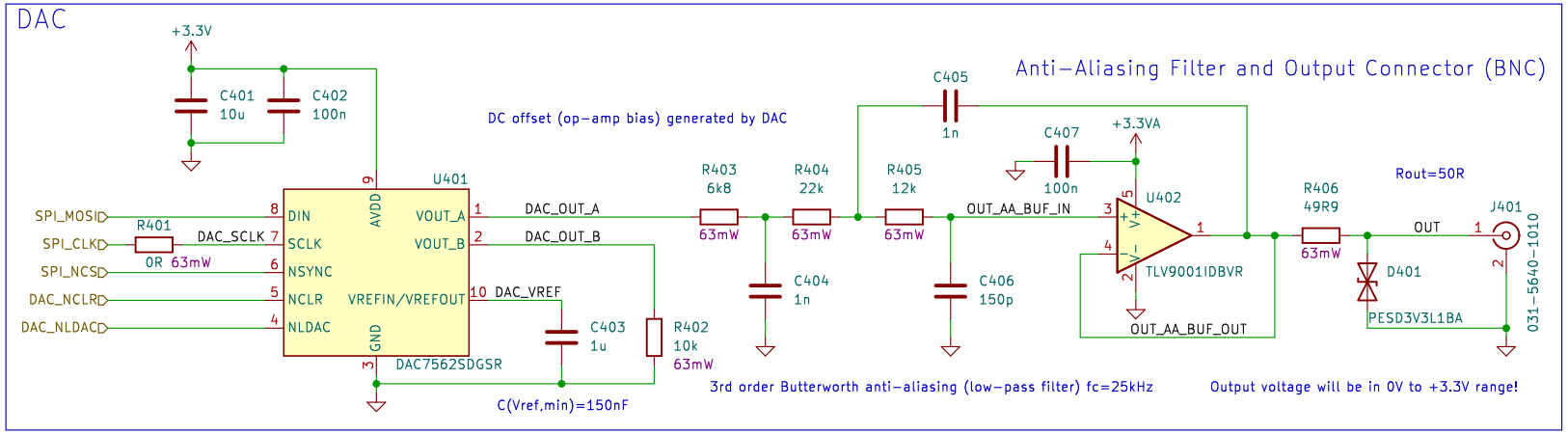
MCP6001: I/O Rail-to-Rail, Single-Supply (1V8 to 5V), high-impedance input CMOS, low bias currents, unity gain stable



14-Bit S/H ADC



LP		
Sheet: /[3] ADC/		
File: adc.kicad_sch		
Title: RP2040 Audio Board		
Size: A4	Date: 2023-05-01	**Rev: 0.1**
KiCad E.D.A. kicad (7.0.0)		Id: 4/5



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LP		
Sheet: /[4] DAC/ File: dac.kicad_sch		
Title: RP2040 Audio Board		
Size: A4	Date: 2023-05-01	**Rev: 0.1**
KiCad E.D.A. kicad (7.0.0)		Id: 5/5