micro−rp2040

Microcontroller

File: micro−rp2040.kicad_sch

TODO: add some pull down to VREF_VOUT to ensure proper partial power down of 74lvc1t45

IO−expand−595−mux

Peripherals

File: IO−expand−595−mux.kicad_sch

bpu−current_limiter

Adjustable power supply

File: bpu−current_limiter.kicad_sch

bpu−iobufffer

IO buffer

File: bpu−iobufffer.kicad_sch

leds

RGB LEDs

File: leds.kicad_sch

FCC

logo1
fcc_logo

FID1
Fiducial

FID2
Fiducial

FID3
Fiducial

FID4
Fiducial

FID5
Fiducial

H1
MountingHole

H2
MountingHole

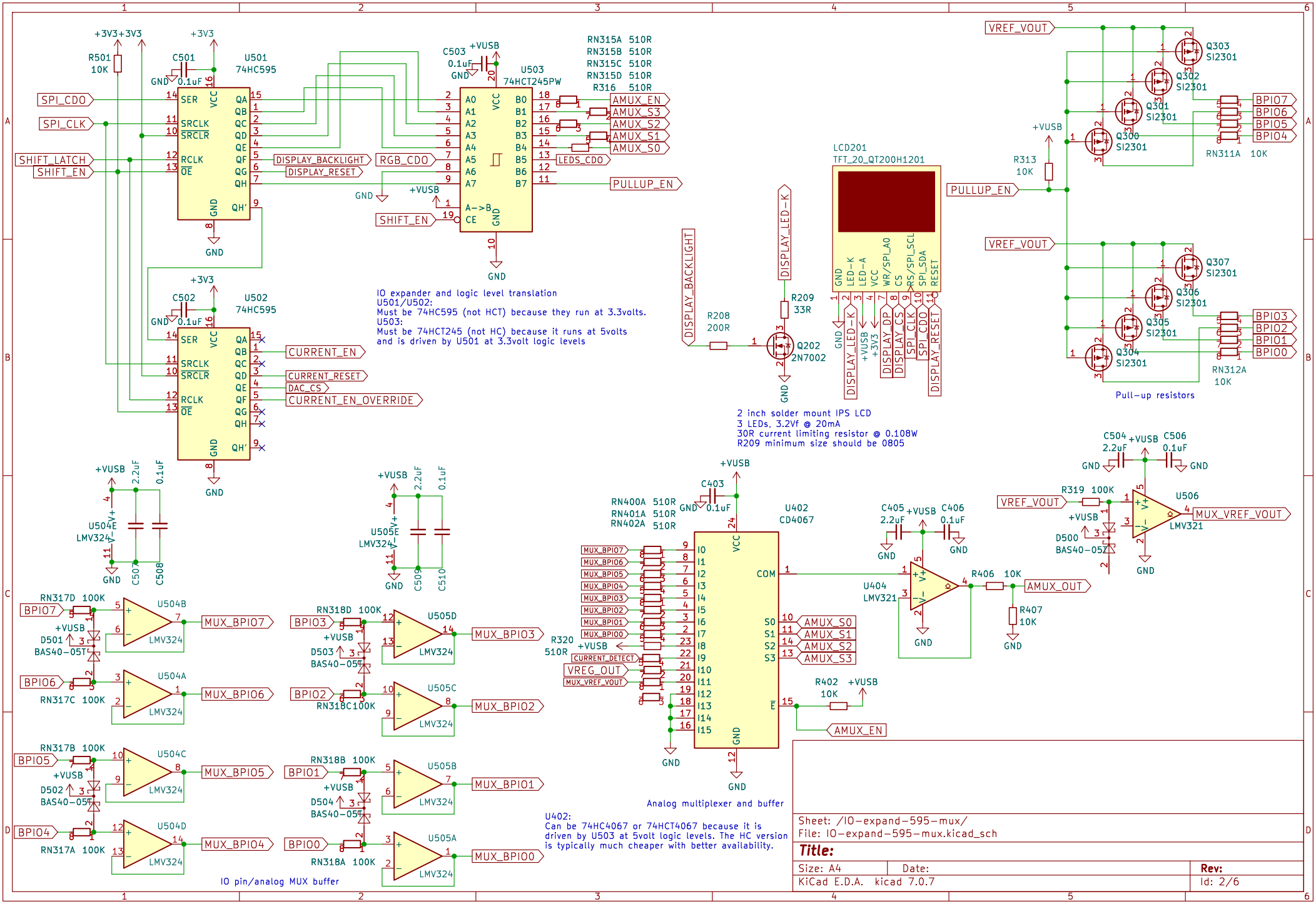
H3
MountingHole

H4
MountingHole

Sheet: /
File: BusPirate−5−rev10.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.7		Id: 1/6


SPI_CDO
SPI_CLK
SHIFT_LATCH
SHIFT_EN
U501
74HC595
U502
74HC595
U503
74HCT245PW
DISPLAY_BACKLIGHT
DISPLAY_RESET
RGB_CDO
CURRENT_EN
CURRENT_RESET
DAC_CS
CURRENT_EN_OVERRIDE
AMUX_EN
AMUX_S3
AMUX_S2
AMUX_S1
AMUX_S0
LEDS_CDO
PULLUP_EN
IO expander and logic level translation
U501/U502:
Must be 74HC595 (not HCT) because they run at 3.3volts.
U503:
Must be 74HCT245 (not HC) because it runs at 5volts
and is driven by U501 at 3.3volt logic levels
LCD201
TFT_20_QT200H1201
DISPLAY_BACKLIGHT
DISPLAY_LED-K
R208
200R
R209
33R
Q202
2N7002
2 inch solder mount IPS LCD
3 LEDs, 3.2Vf @ 20mA
30R current limiting resistor @ 0.108W
R209 minimum size should be 0805
VREF_VOUT
PULLUP_EN
R313
10K
Q303
SI2301
Q302
SI2301
Q301
SI2301
Q300
SI2301
RN311A 10K
BPIO7
BPIO6
BPIO5
BPIO4
Q307
SI2301
Q306
SI2301
Q305
SI2301
Q304
SI2301
RN312A
10K
BPIO3
BPIO2
BPIO1
BPIO0
Pull-up resistors
U504E
LMV324
U505E
LMV324
U504B
U504A
U504C
U504D
U505D
U505C
U505B
U505A
LMV324
RN317D 100K
RN317C 100K
RN317B 100K
RN317A 100K
RN318D 100K
RN318C 100K
RN318B 100K
RN318A 100K
D501
BAS40-05T
D502
BAS40-05T
D503
BAS40-05T
D504
BAS40-05T
MUX_BPIO7
MUX_BPIO6
MUX_BPIO5
MUX_BPIO4
MUX_BPIO3
MUX_BPIO2
MUX_BPIO1
MUX_BPIO0
IO pin/analog MUX buffer
U402
CD4067
RN400A 510R
RN401A 510R
RN402A 510R
R320
510R
CURRENT_DETECT
VREG_OUT
MUX_VREF_VOUT
R402
10K
Analog multiplexer and buffer
U402:
Can be 74HC4067 or 74HCT4067 because it is
driven by U503 at 5volt logic levels. The HC version
is typically much cheaper with better availability.
U404
LMV321
R406
10K
R407
10K
U506
LMV321
R319 100K
D500
BAS40-05T
MUX_VREF_VOUT
Sheet: /IO-expand-595-mux/
File: IO-expand-595-mux.kicad_sch
Title:
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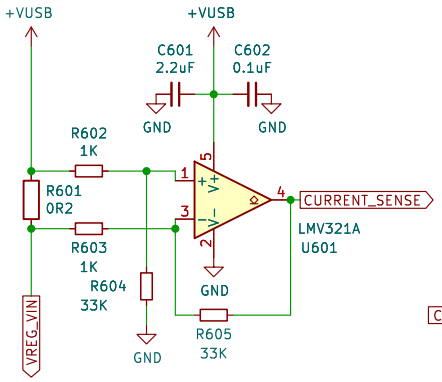
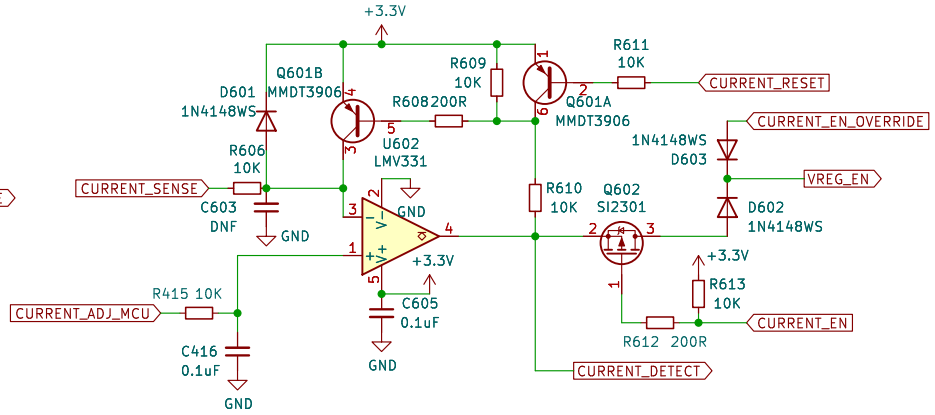
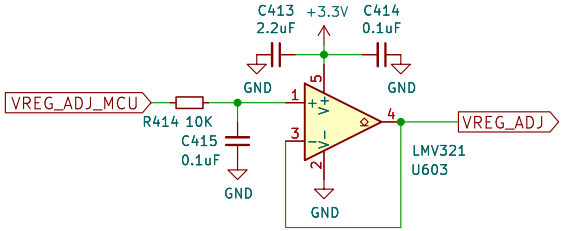


Current sense

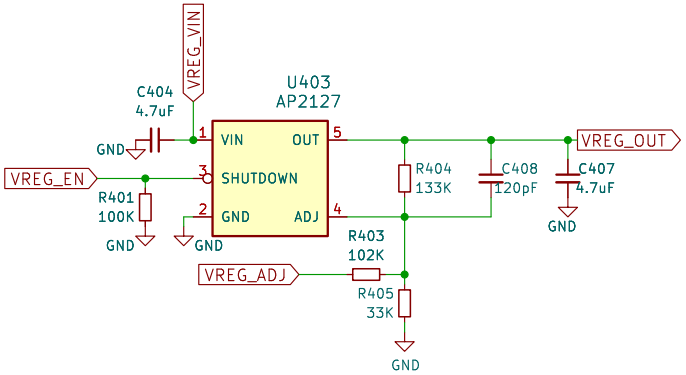


Current limit

Q601 is a general purpose dual PNP transistor with EBCEBC pinout.
Matched pair Q401 can be substituted here, but Q401 is more expensive.



Buffer circuit for Voltage Adjust, when using the MCU
to do PWM instead U406 as DAC

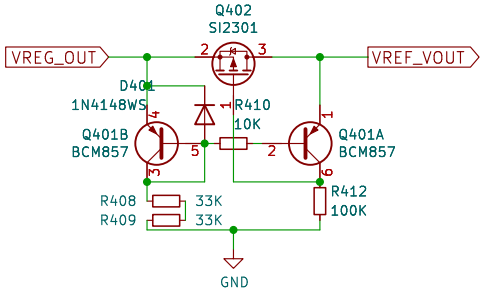


Adjustable voltage regulator

MCP1824 and AP2127 can be used, but have different reference voltages.

MCP1824: Ideal R403/R404/R405 = 77.96K/99.22K/10K
Closest values are 78K/100K/10K

AP2127: Ideal R403/R404/R405 = 31.25K/39.77K/10K
Closest values are 31.6K/40.2K/10K



Backflow prevention

Q401 is a matched PNP pair with EBCEBC pinout.
BCM857, BCM856, NST45010MW6T1G can be substituted.
The BCM part numbers are made by several manufacturers.
This part may be substituted in Q601, but it costs significantly more.

DMMT3906, PMP5201, PMP5501 are similar but have a BBCEEC pinout.
These can be substituted with minor changes to the PCB.

Sheet: /bpu-current_limiter/		
File: bpu-current_limiter.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
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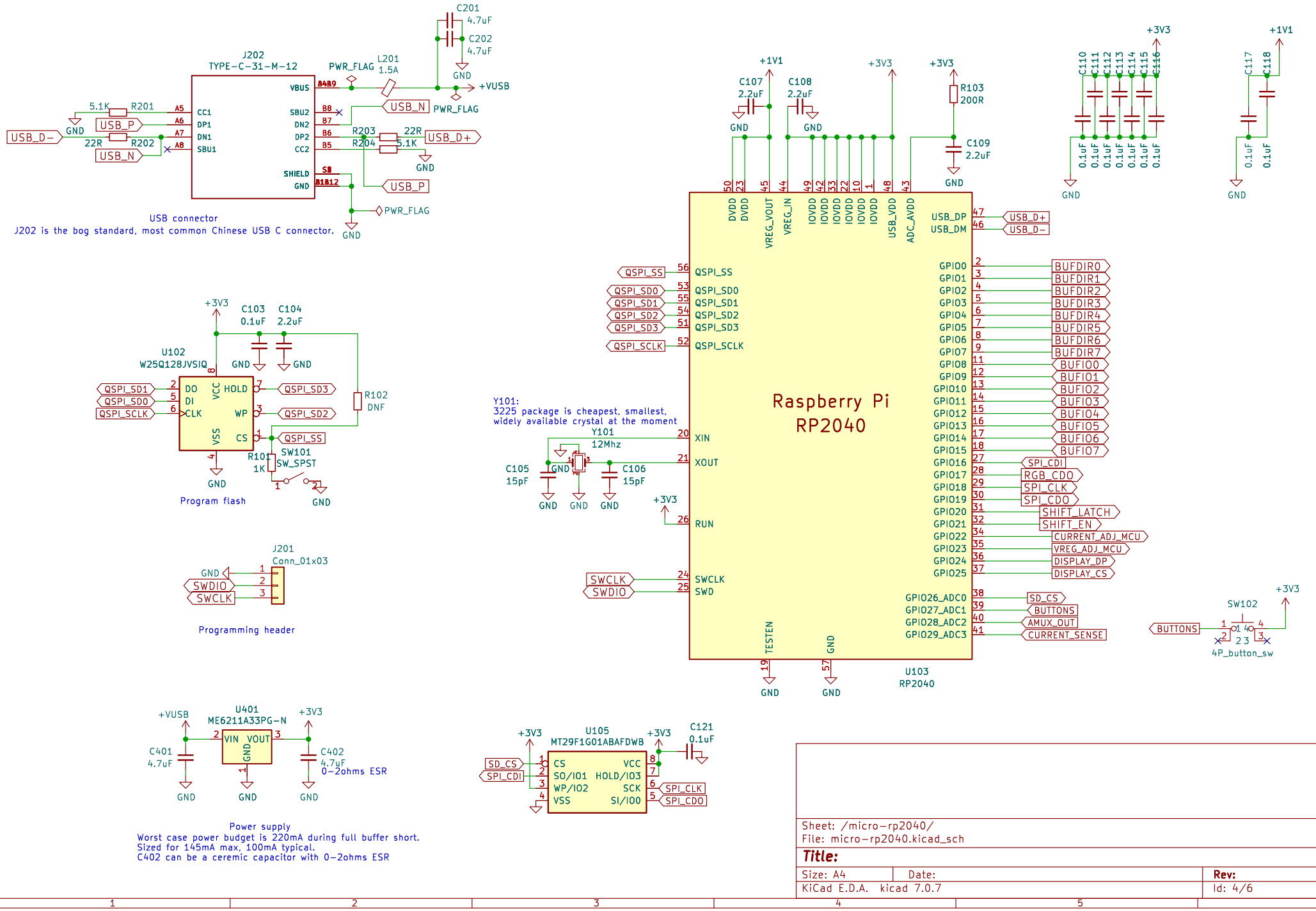
J202
TYPE-C-31-M-12
C201
4.7uF
C202
4.7uF
PWR_FLAG
L201
1.5A
+VUSB
USB_N
PWR_FLAG
USB_D-
USB_P
USB_N
USB_D+
USB_P
PWR_FLAG
USB connector
J202 is the bog standard, most common Chinese USB C connector.
U102
W25Q128JVSIQ
Program flash
R102
DNF
R101
1K
SW101
SW_SPST
J201
Conn_01x03
SWDIO
SWCLK
Programming header
Y101:
3225 package is cheapest, smallest, widely available crystal at the moment
Y101
12Mhz
C105
15pF
C106
15pF
Raspberry Pi
RP2040
U103
RP2040
C107
2.2uF
C108
2.2uF
R103
200R
C109
2.2uF
C110
C111
C112
C113
C114
C115
C116
C117
C118
0.1uF
+1V1
+3V3
GND
BUFDIR0
BUFDIR1
BUFDIR2
BUFDIR3
BUFDIR4
BUFDIR5
BUFDIR6
BUFDIR7
BUFIO0
BUFIO1
BUFIO2
BUFIO3
BUFIO4
BUFIO5
BUFIO6
BUFIO7
SPI_CDI
RGB_CDO
SPI_CLK
SPI_CDO
SHIFT_LATCH
SHIFT_EN
CURRENT_ADJ_MCU
VREG_ADJ_MCU
DISPLAY_DP
DISPLAY_CS
SD_CS
BUTTONS
AMUX_OUT
CURRENT_SENSE
SW102
4P_button_sw
U401
ME6211A33PG-N
C401
4.7uF
C402
4.7uF
0-2ohms ESR
Power supply
Worst case power budget is 220mA during full buffer short.
Sized for 145mA max, 100mA typical.
C402 can be a ceremic capacitor with 0-2ohms ESR
U105
MT29F1G01ABAFDWB
C121
0.1uF
Sheet: /micro-rp2040/
File: micro-rp2040.kicad_sch
Title:
Size: A4
Date:
Rev:
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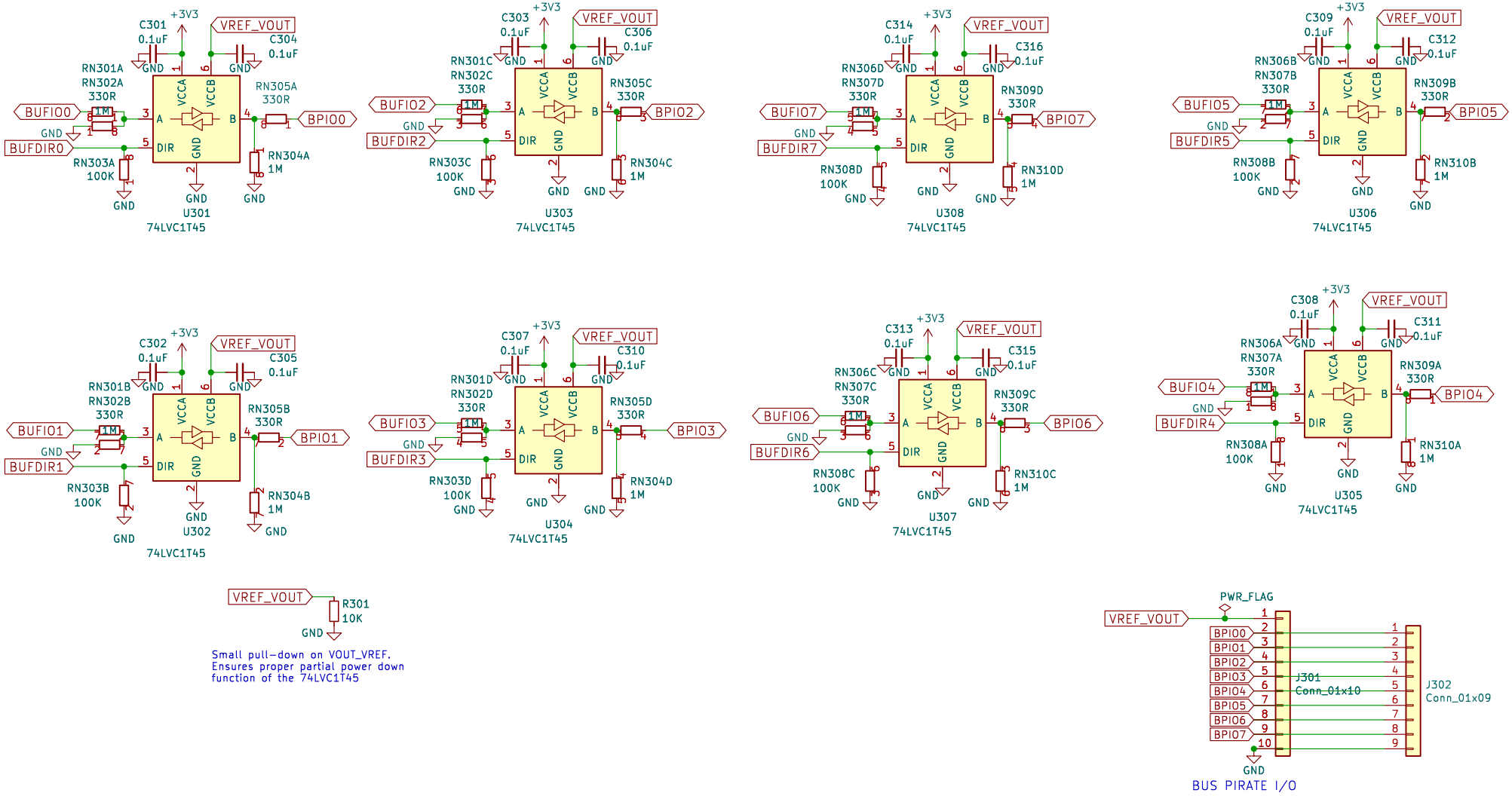
Id: 4/6



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Size: A4	Date:	**Rev:**
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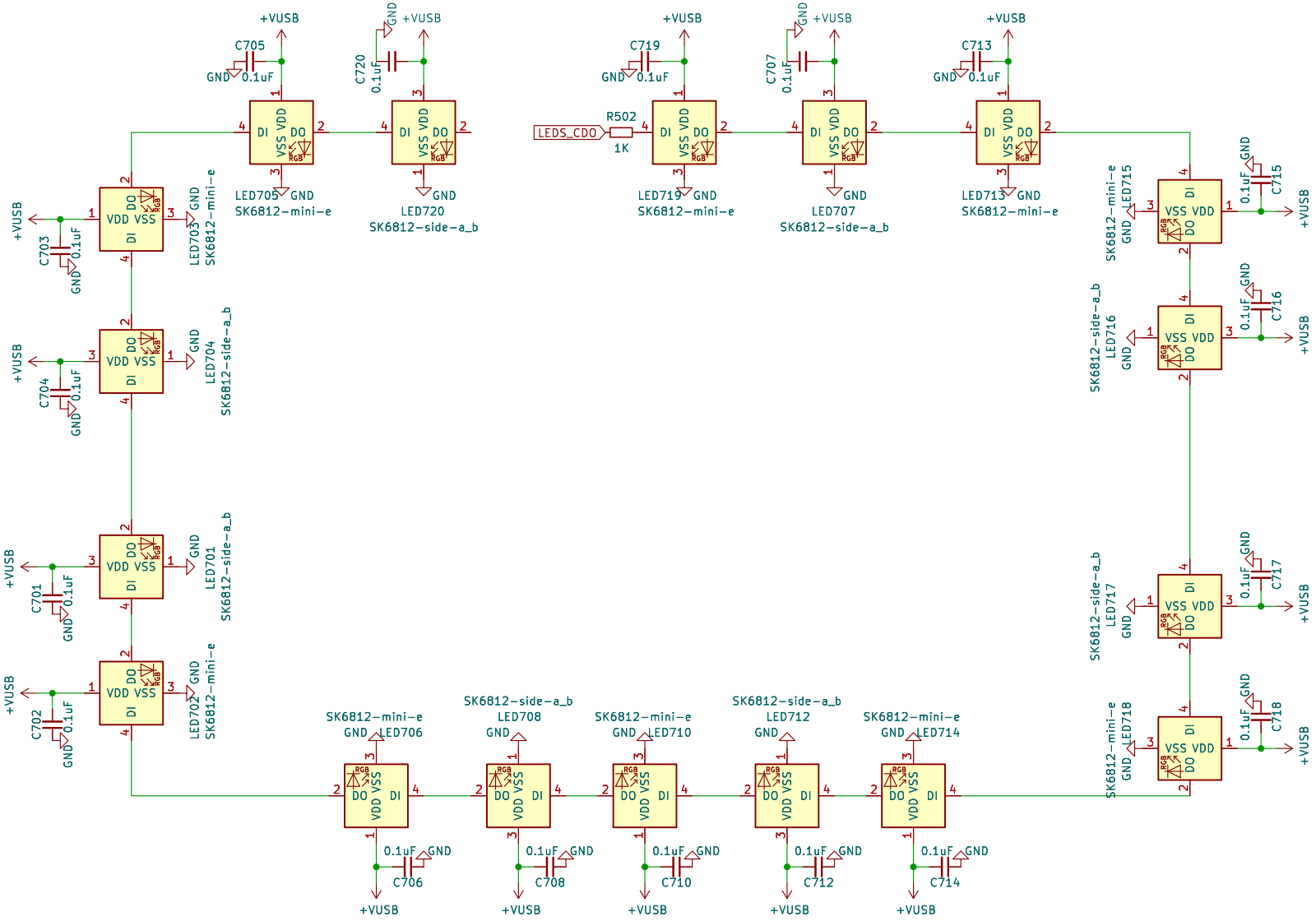

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Title:		
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