CEL - Robox 2 - Mainboard - ISSUE D3

Revision History

Rev. Code	Date	Description
A1	16/01/2019	1st release, with stepper motor drivers swapped to TMC2130s, 5V PSU beefed up to power a Pi as well as the on board requirements, and for use with the updated extruder boards RBX-PCB-EX02-A. Mains detect and 115V/230V detection circuit changed, with the intention of speeding up the detection capability to allow time to record the head position.
B0.1	09/05/2019	1. Commonality of stepper motor outputs with Impact Head Rev C & Extruder rev B 2. Mains detect circuit replaced with MIC841H & H11L1SM 3. R37, R49, R47 & R74 removed. Stepper 5V rails tidied up 4. 3V3 decoupling caps added to stepper drivers 5. Stepper drivers moved from extruder boards to this mainboard, zif connectors kept but pinout updated 6. All TMC stepper drivers to TA type (TQFP) 7. J27 pin 1 fan option 2 direct to GND?
B0.2	10/05/2019	I2C added to extruder zif connectors (all TMC DCIN pins to tie low to free up MCU pins) On board temperature sensor D12 DNF R58 reinstated
B1	04/06/2019	Stepper pinout swapped for routing - but compatible with the standard. ~~PRF~~1 connected to 3V3 not GND.
C0.1	04/05/2020	Swapped stepper motors to step-stick modules for review
C0.2	06/05/2020	Swapped from dual step sticks to jumper selection
C0.3	15/05/2020	J23 removed. Datapack released for quote (with rev B Gerbers) Some pin swapping to ease tracking
C1	11/06/2020	Review comment tidyup. C69 altered to filter across R39. C59 downrated. Z_STOP_A and Z_STOP_B nets on processor moved to low res (10 bit) ADC pins to allow use with strain gauges - swapped with Z+_STOP and PWR.HEAD_VDET respectively.
C2	29/06/2020	Mains fuse added to BoM for installing into fuse holder
D1	22/12/2020	Q1 swapped to AON7524, R1 to 3K3, R2 to 47K. R2 moved to the other side of R1, and thermal area for Q1 increased
D2	10/03/2021	R2 to 5K1
D3	09/11/2021	U13 removed (further update required to remove tracking from pin 4 - not actually internally unconnected as stated in the datasheet)

GENERAL DESIGN NOTES

1
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System
02 System.SchDoc

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Drawing Title: CEL - Robox 2 - Mainboard
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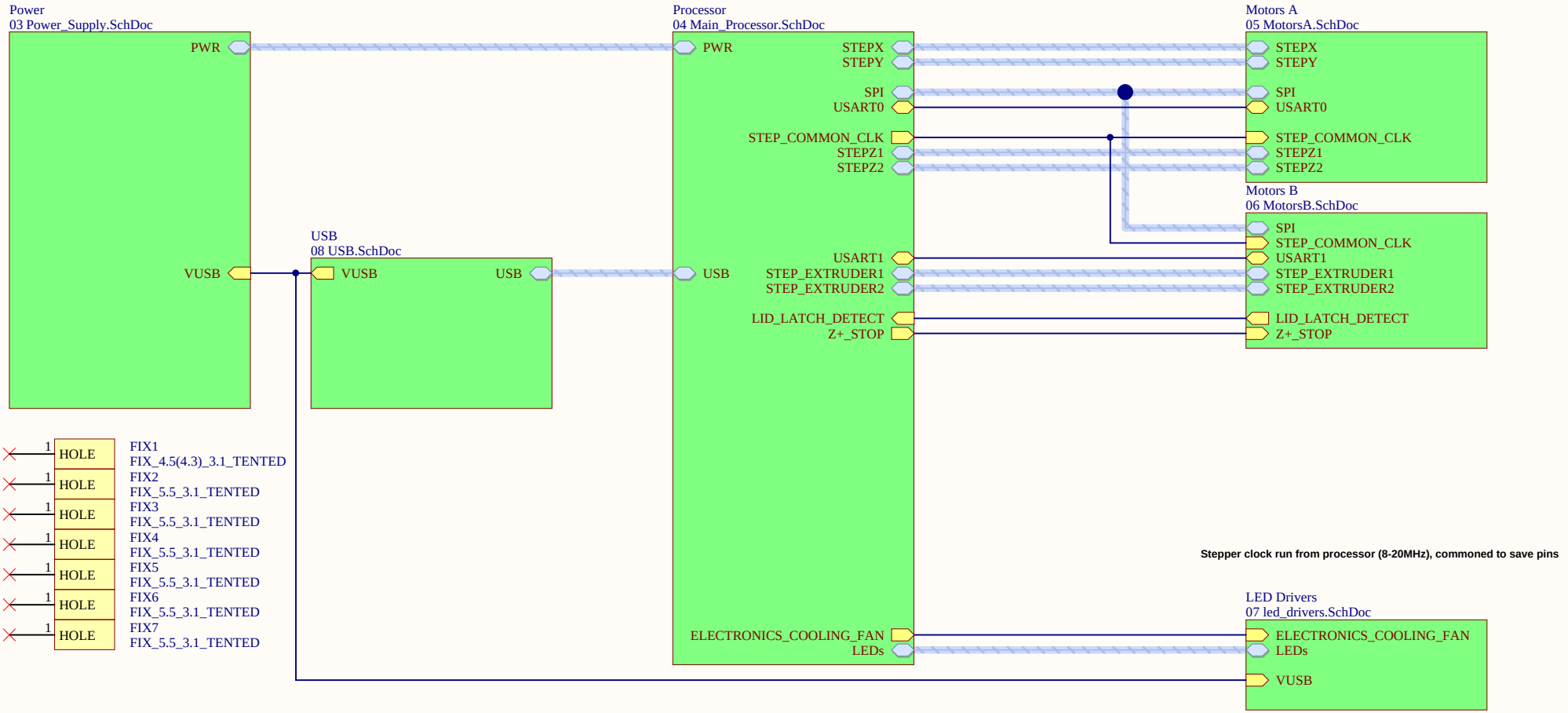
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03 Power_Supply.SchDoc
PWR
VUSB
USB
08 USB.SchDoc
VUSB
USB
Processor
04 Main_Processor.SchDoc
PWR
USB
STEPX
STEPY
SPI
USART0
STEP_COMMON_CLK
STEPZ1
STEPZ2
USART1
STEP_EXTRUDER1
STEP_EXTRUDER2
LID_LATCH_DETECT
Z+_STOP
ELECTRONICS_COOLING_FAN
LEDs
Motors A
05 MotorsA.SchDoc
STEPX
STEPY
SPI
USART0
STEP_COMMON_CLK
STEPZ1
STEPZ2
Motors B
06 MotorsB.SchDoc
SPI
STEP_COMMON_CLK
USART1
STEP_EXTRUDER1
STEP_EXTRUDER2
LID_LATCH_DETECT
Z+_STOP
LED Drivers
07 led_drivers.SchDoc
ELECTRONICS_COOLING_FAN
LEDs
VUSB
Stepper clock run from processor (8-20MHz), commoned to save pins
1 HOLE FIX1 FIX_4.5(4.3)_3.1_TENTED
1 HOLE FIX2 FIX_5.5_3.1_TENTED
1 HOLE FIX3 FIX_5.5_3.1_TENTED
1 HOLE FIX4 FIX_5.5_3.1_TENTED
1 HOLE FIX5 FIX_5.5_3.1_TENTED
1 HOLE FIX6 FIX_5.5_3.1_TENTED
1 HOLE FIX7 FIX_5.5_3.1_TENTED
1 FIDUCIAL FID1 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID2 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID3 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID4 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID5 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID6 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID7 FID_C1.0_SQ3_CLEAR
1 FIDUCIAL FID8 FID_C1.0_SQ3_CLEAR
PCB1
PCB
RBX-PCB-MB02-D
ESD1
ESD symbol 165 x 152
CEL1
CEL Robox Symbol
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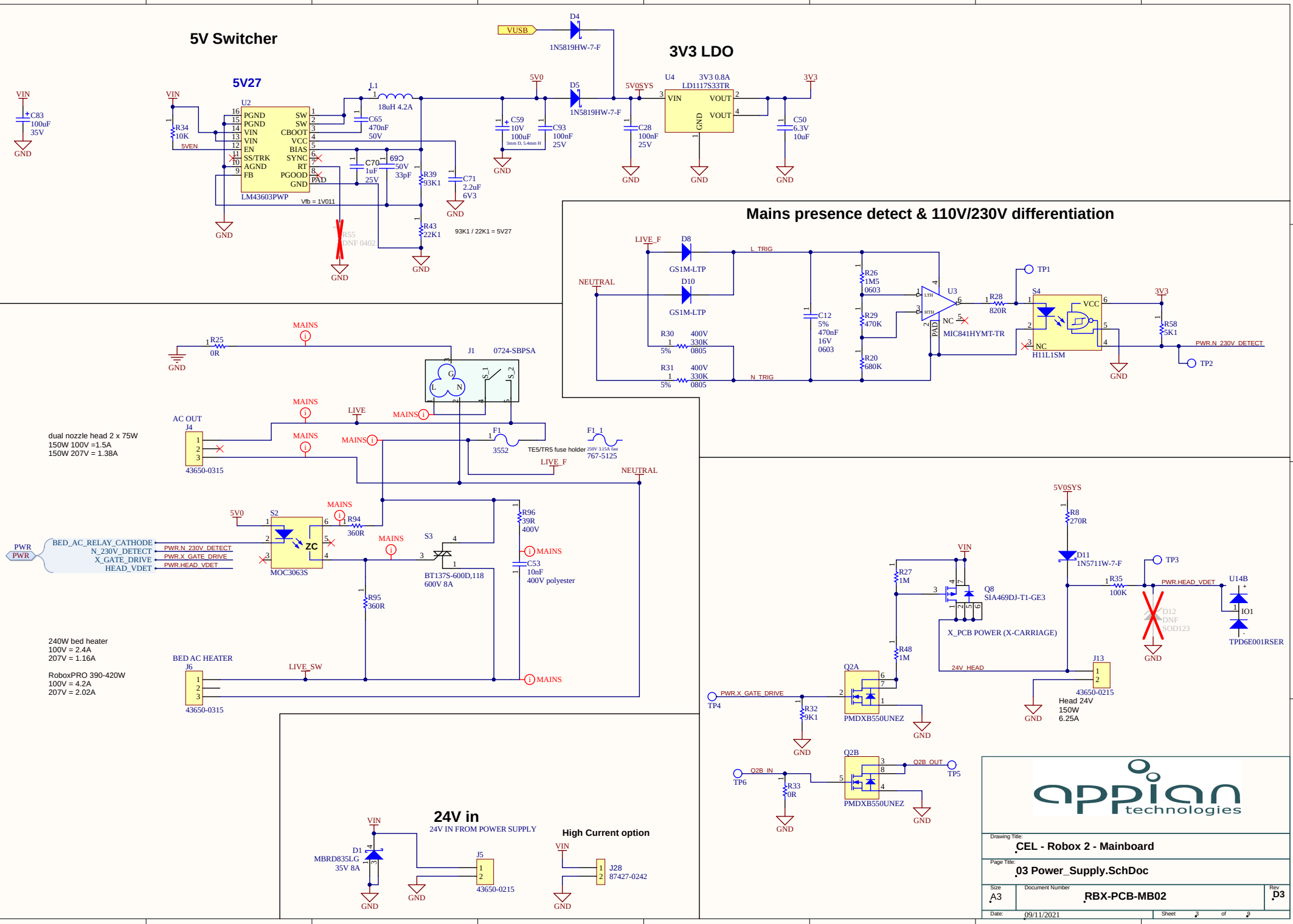
5V Switcher
5V27
VIN
C83
100uF
35V
GND
U2
LM43603PWP
PGND
PGND
VIN
VIN
EN
SS/TRK
AGND
FB
SW
SW
CBOOT
VCC
BIAS
SYNC
RT
PGOOD
GND
PAD
R34
10K
5VEN
L1
18uH 4.2A
C65
470nF
50V
C70
1uF
25V
69Ω
50V
33pF
R39
93K1
C71
2.2uF
6V3
R43
22K1
93K1 / 22K1 = 5V27
R55
DNF 0402
Vfb = 1V011
VUSB
D4
1N5819HW-7-F
3V3 LDO
5V0
D5
1N5819HW-7-F
5V0SYS
U4
3V3 0.8A
LD1117S33TR
VIN
VOUT
VOUT
GND
3V3
C59
10V
100uF
5mm D, 5.4mm H
C93
100nF
25V
C28
100nF
25V
C50
6.3V
10uF
Mains presence detect & 110V/230V differentiation
LIVE_F
NEUTRAL
D8
GS1M-LTP
D10
GS1M-LTP
L_TRIG
N_TRIG
C12
5%
470nF
16V
0603
R30
400V
1
330K
5%
0805
R31
400V
1
330K
5%
0805
R26
1M5
0603
R29
470K
R20
680K
U3
LTH
HTH
PAD
NC
MIC841HYMT-TR
R28
820R
TP1
S4
VCC
NC
H11L1SM
3V3
R58
5K1
PWR.N_230V_DETECT
TP2
GND
MAINS
R25
0R
J1
0724-SBPSA
L
N
S_1
S_2
LIVE
AC OUT
J4
43650-0315
dual nozzle head 2 x 75W
150W 100V =1.5A
150W 207V = 1.38A
F1
3552
TE5/TR5 fuse holder
F1_1
250V 3.15A fast
767-5125
LIVE_F
NEUTRAL
5V0
S2
ZC
MOC3063S
R94
360R
S3
BT137S-600D,118
600V 8A
R96
39R
400V
C53
10nF
400V polyester
R95
360R
PWR
BED_AC_RELAY_CATHODE
N_230V_DETECT
X_GATE_DRIVE
HEAD_VDET
PWR.N_230V_DETECT
PWR.X_GATE_DRIVE
PWR.HEAD_VDET
240W bed heater
100V = 2.4A
207V = 1.16A
RoboxPRO 390-420W
100V = 4.2A
207V = 2.02A
BED AC HEATER
J6
43650-0315
LIVE_SW
5V0SYS
R8
270R
D11
1N5711W-7-F
R35
100K
TP3
PWR.HEAD_VDET
D12
DNF
SOD123
U14B
IO1
TPD6E001RSER
VIN
R27
1M
Q8
SIA469DJ-T1-GE3
X_PCB POWER (X-CARRIAGE)
24V_HEAD
J13
43650-0215
Head 24V
150W
6.25A
R48
1M
Q2A
PMDXB550UNEZ
PWR.X_GATE_DRIVE
TP4
R32
9K1
Q2B
PMDXB550UNEZ
Q2B_IN
TP6
R33
0R
Q2B_OUT
TP5
24V in
24V IN FROM POWER SUPPLY
D1
MBRD835LG
35V 8A
J5
43650-0215
High Current option
J28
87427-0242
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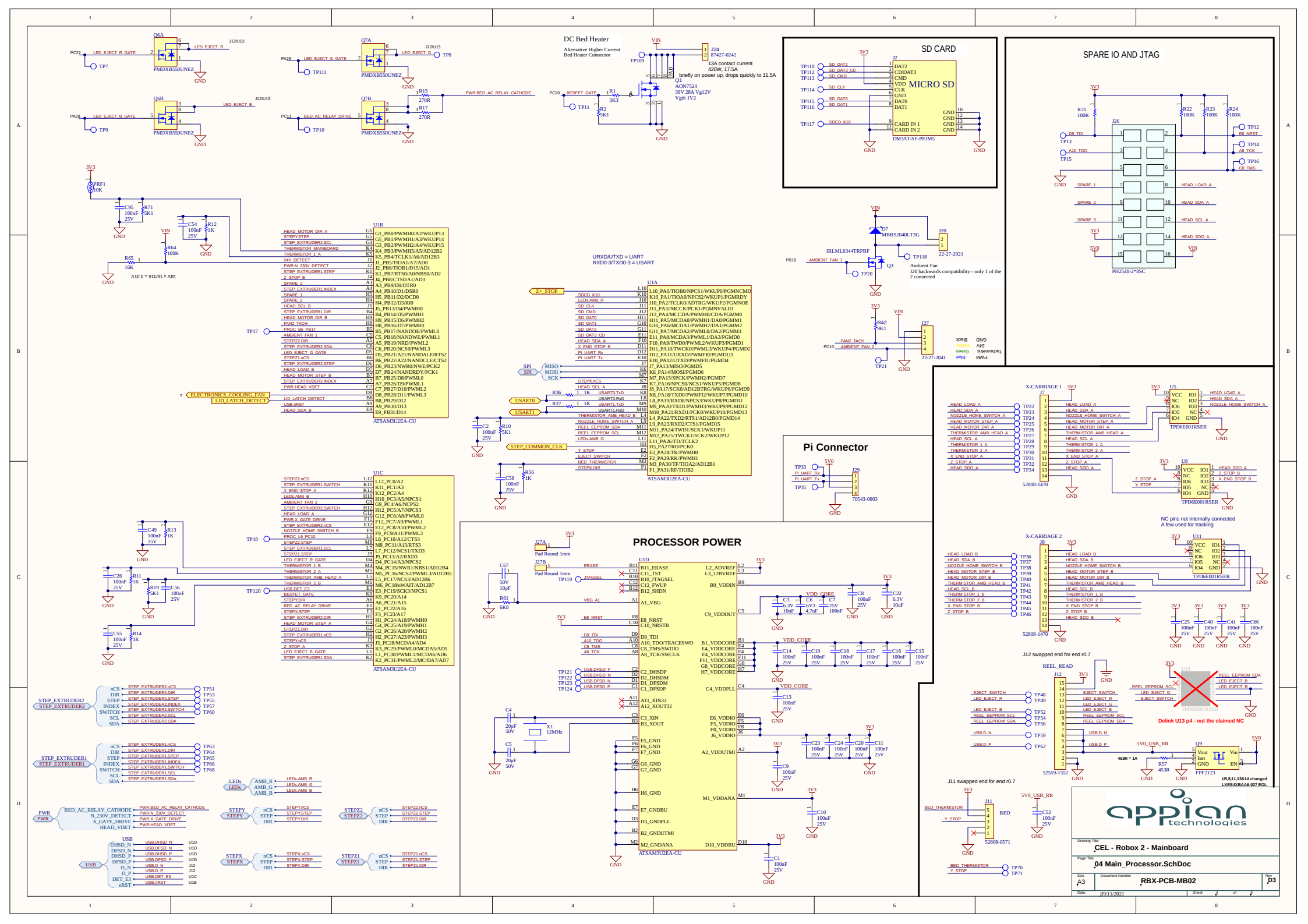
DC Bed Heater
Alternative Higher Current Bed Heater Connector
13A contact current
420W, 17.5A
briefly on power up, drops quickly to 11.5A
Q1
AON7524
30V 28A Vg12V
Vgth 1V2
SD CARD
MICRO SD
DM3AT-SF-PEJM5
SPARE IO AND JTAG
PH2540-2*8SC
URXD/UTXD = UART
RXD0-3/TXD0-3 = USART
Ambient Fan
J20 backwards compatibility - only 1 of the 2 connected
Pi Connector
PROCESSOR POWER
ATSAM3U2EA-CU
X-CARRIAGE 1
X-CARRIAGE 2
TPD6E001RSER
NC pins not internally connected
A few used for tracking
J12 swapped end for end r0.7
REEL_READ
Delink U13 p4 - not the claimed NC
J11 swapped end for end r0.7
5V0_USB_RR
453R = 1A
US,B,11,13&14 changed
LXES4XBAA6-027 EOL
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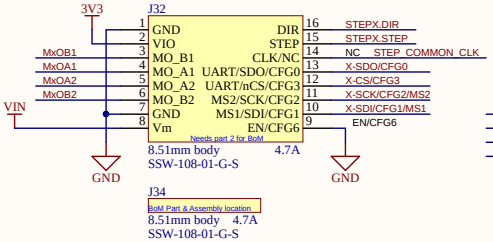
STEPPER MOTOR DRIVES

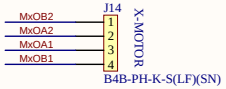
BIQU DIRECT 3D Printer Part Stepstick Mute TMC2209 V1.2

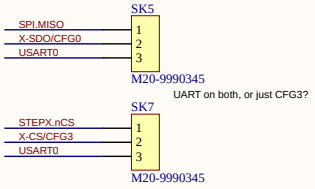
Pin 1 SPI (TMC2130)
Pin 3 UART (TMC2209)

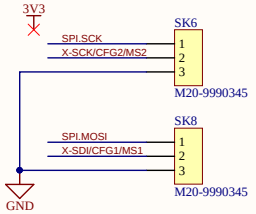
STEP_COMMON_CLK
SPI: SCK, MOSI, MISO — SPI.SCK, SPI.MOSI, SPI.MISO
USART0
STEPX: nCS, STEP, DIR — STEPX.nCS, STEPX.STEP, STEPX.DIR

X MOTOR



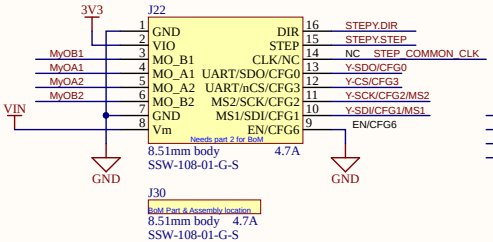




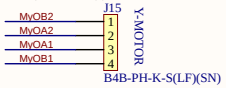


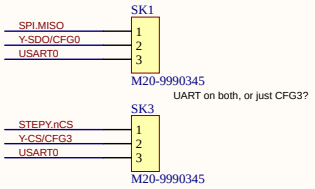
Y MOTOR

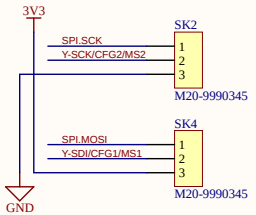
STEPY: nCS, STEP, DIR — STEPY.nCS, STEPY.STEP, STEPY.DIR



Stepstick winding pairs '1' and '2'

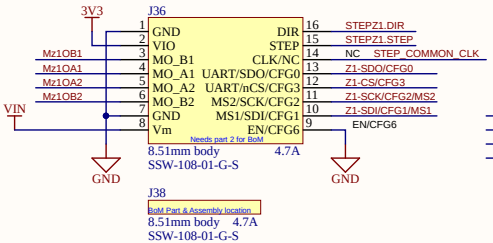


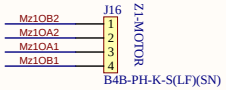


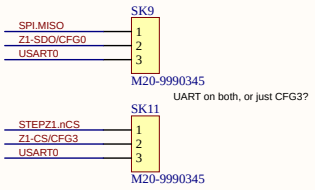


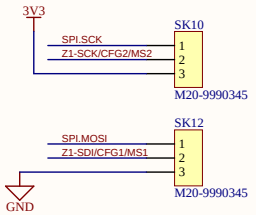
Z1 MOTOR

STEPZ1: nCS, STEP, DIR — STEPZ1.nCS, STEPZ1.STEP, STEPZ1.DIR



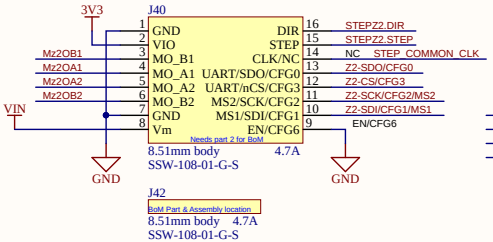


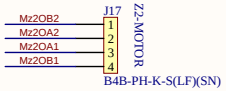


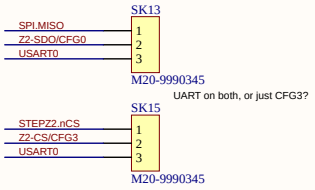


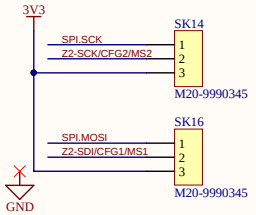
Z2 MOTOR

STEPZ2: nCS, STEP, DIR — STEPZ2.nCS, STEPZ2.STEP, STEPZ2.DIR









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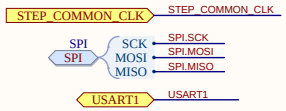
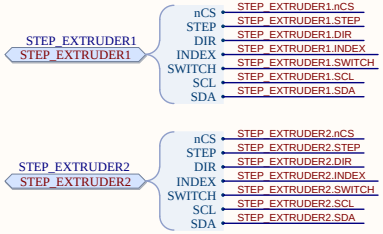
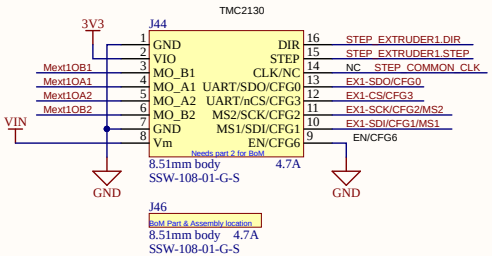
STEPPER MOTOR DRIVES

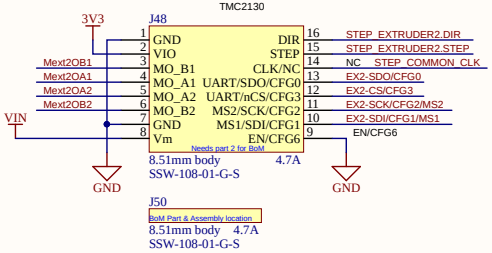


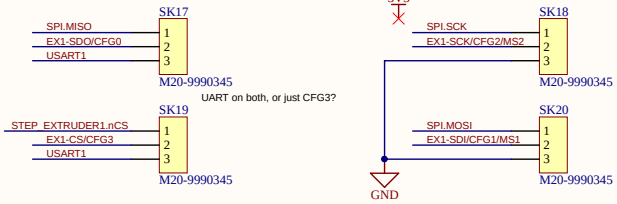


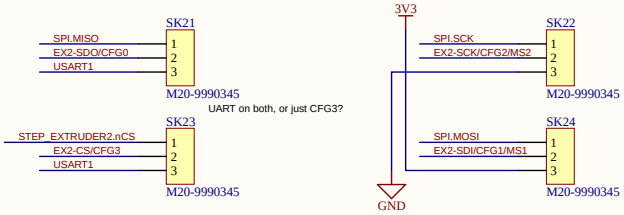
EXTRUDER 1 MOTOR



EXTRUDER 2 MOTOR

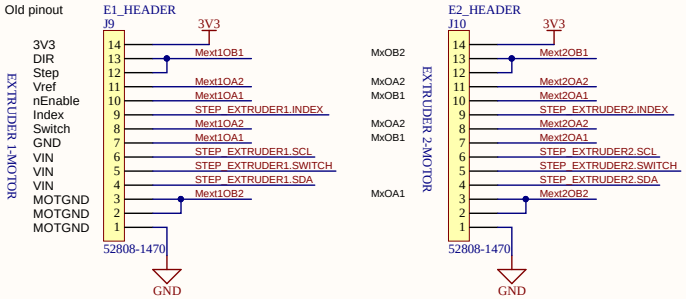




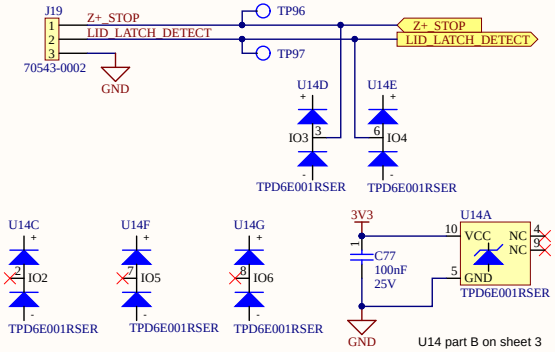


EXTRUDER 1 & 2 HEADERS
14 way flexi + Separate power

J9/10 swapped end for end r0.7



Z+ STOP & LID LATCH



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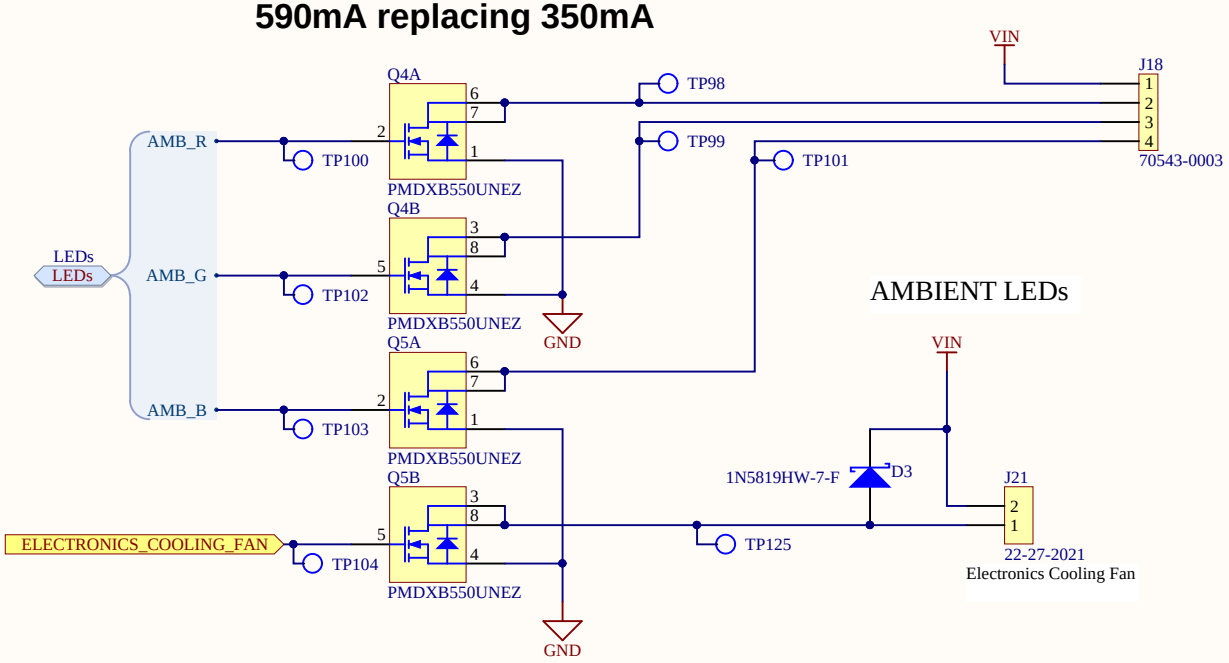

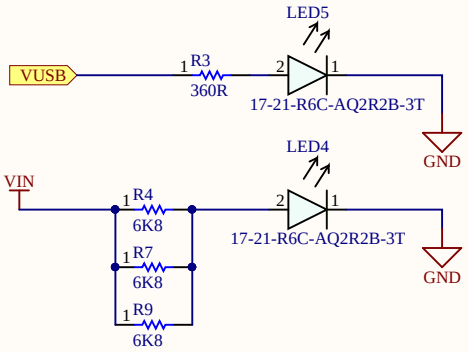

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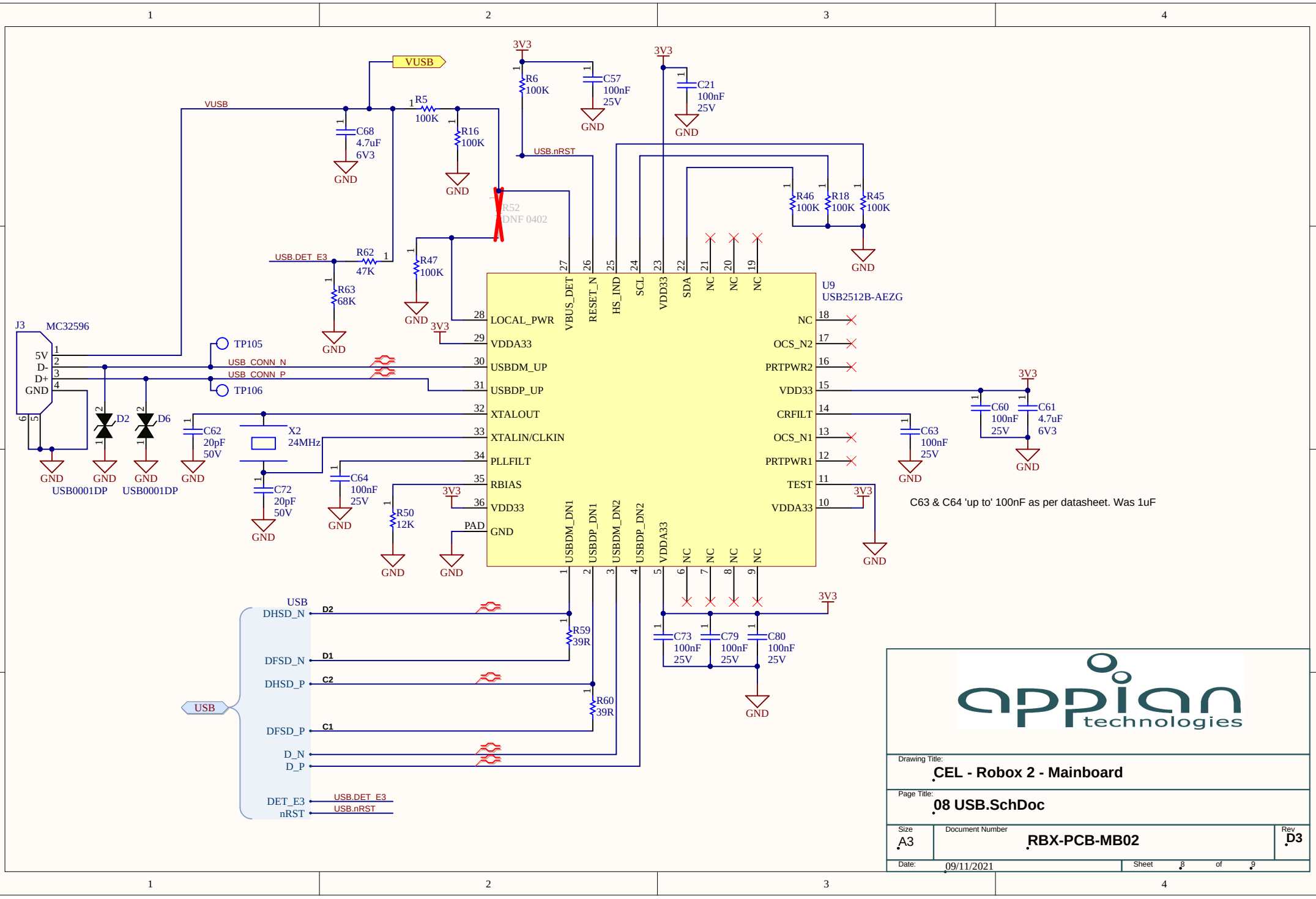
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3V3
R6 100K
C57 100nF 25V
C21 100nF 25V
R5 100K
R16 100K
C68 4.7uF 6V3
USB.nRST
R52 DNF 0402
R46 100K
R18 100K
R45 100K
USB.DET_E3
R62 47K
R47 100K
R63 68K
J3 MC32596
5V
D-
D+
GND
TP105
TP106
USB_CONN_N
USB_CONN_P
D2
D6
USB0001DP
C62 20pF 50V
X2 24MHz
C72 20pF 50V
C64 100nF 25V
R50 12K
U9
USB2512B-AEZG
LOCAL_PWR
VDDA33
USBDM_UP
USBDP_UP
XTALOUT
XTALIN/CLKIN
PLLFILT
RBIAS
VDD33
PAD
GND
VBUS_DET
RESET_N
HS_IND
SCL
VDD33
SDA
NC
OCS_N2
PRTPWR2
CRFILT
OCS_N1
PRTPWR1
TEST
USBDM_DN1
USBDP_DN1
USBDM_DN2
USBDP_DN2
C63 100nF 25V
C60 100nF 25V
C61 4.7uF 6V3
C73 100nF 25V
C79 100nF 25V
C80 100nF 25V
R59 39R
R60 39R
USB
DHSD_N
DFSD_N
DHSD_P
DFSD_P
D_N
D_P
DET_E3
nRST
C63 & C64 'up to' 100nF as per datasheet. Was 1uF
appian technologies
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