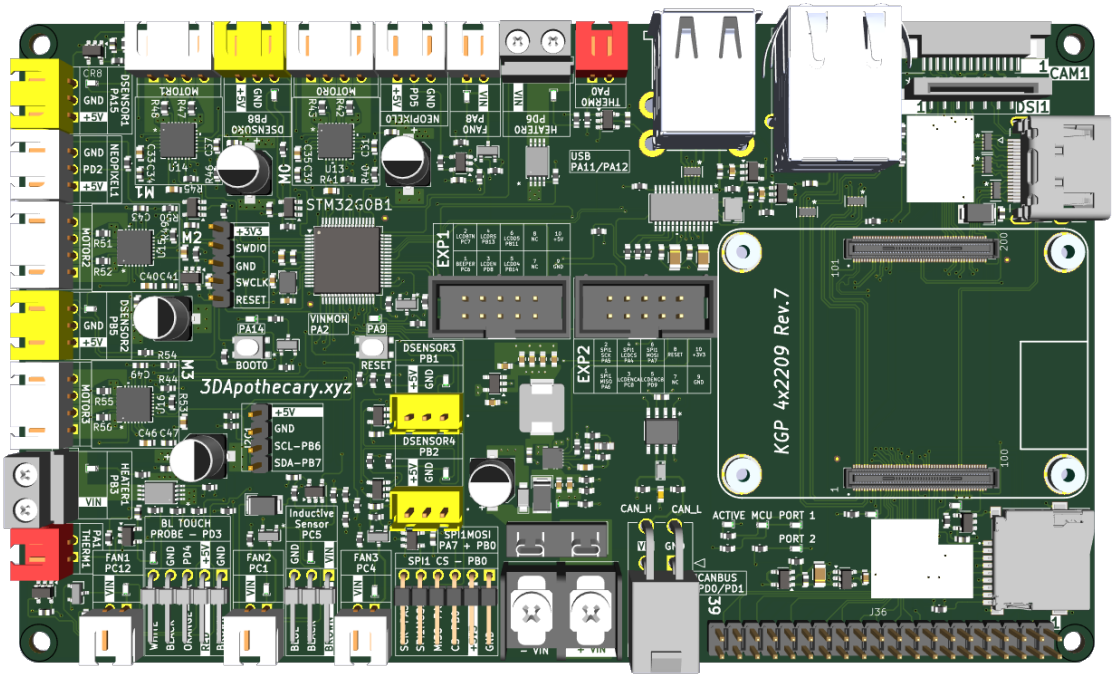

KGP 4x2209 Rev.7 Features:

1. MCU: STM32G0B1RET6
   - DFU Firmware Flashing from Host
2. 12V or 24V Operation
3. Raspberry Pi CM4 (or equivalent host) with:
   - Raspberry Pi: 40 Pin Header/Camera & DSI Sockets
   - Full Size HDMI Socket
   - RJ45 Ethernet Socket
   - 2x USB A Sockets
4. 6A 5V Power
5. 3D Printer Interfaces:
   - MCU Function Pins on PCB Silkscreen
   - DFU/Reset Buttons with LEDs State Indicators
   - 4x TMC2209 Stepper Motor Drivers (White Sockets)
   - 5x Endstop Sensors with LEDs (Yellow Sockets)
   - 2x 15A Heater Drivers with Thermistor Inputs (Red Sockets)
   - 4x Fan Drivers (White Sockets)
   - CAN Interface with Split 60Ω Terminator
   - "EXP1/EXP2" Connectors for use with UC12864 UI
   - SPI Available in "EXP1/EXP2" Connectors & Separate Connector
   - I2C Port with 5V power
   - VIN Voltage Sensor

PWR_MGMT
File: PWM_MGMT.kicad_sch

MCU
File: MCU.kicad_sch

SWD
File: SWD.kicad_sch

BUSES
File: SPI_I2C.kicad_sch

HEATER_THERM
File: HEATER_THERM.kicad_sch

SENSORS
File: SENSORS.kicad_sch

FANS
File: FANS.kicad_sch

3DACC
File: 3DACC.kicad_sch

MOTOR_0
File: MOTOR_0.kicad_sch

MOTOR_1
File: MOTOR_1.kicad_sch

MOTOR_2
File: MOTOR_2.kicad_sch

MOTOR_3
File: MOTOR_3.kicad_sch

CM4_CONN
File: CM4_CONN.kicad_sch

SDCARD
File: SDCARD.kicad_sch

USB
File: USB.kicad_sch

ETHERNET
File: ETHERNET.kicad_sch

RPI40_CONN
File: RPI40_CONN.kicad_sch

HDMI0
File: HDMI0.kicad_sch

CAM1_DSI1
File: CAM1_DSI1.kicad_sch

MISC
File: MISC.kicad_sch

Vision Statement:
The KGP 4x2209 is a complete, cost effective, easy to use Klipper Controller Board for Beginners and Experts.

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Sheet: /
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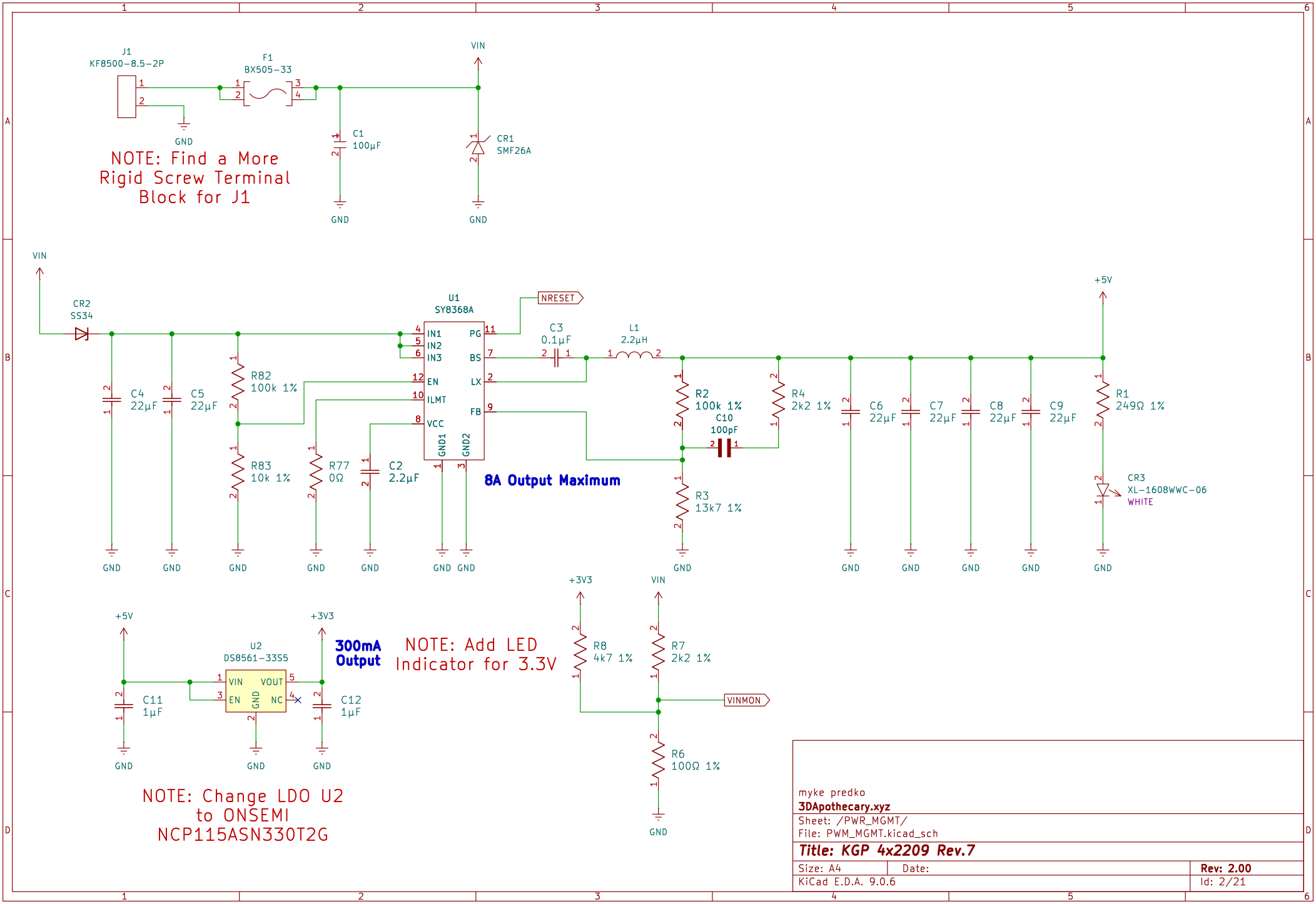
Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 1/21



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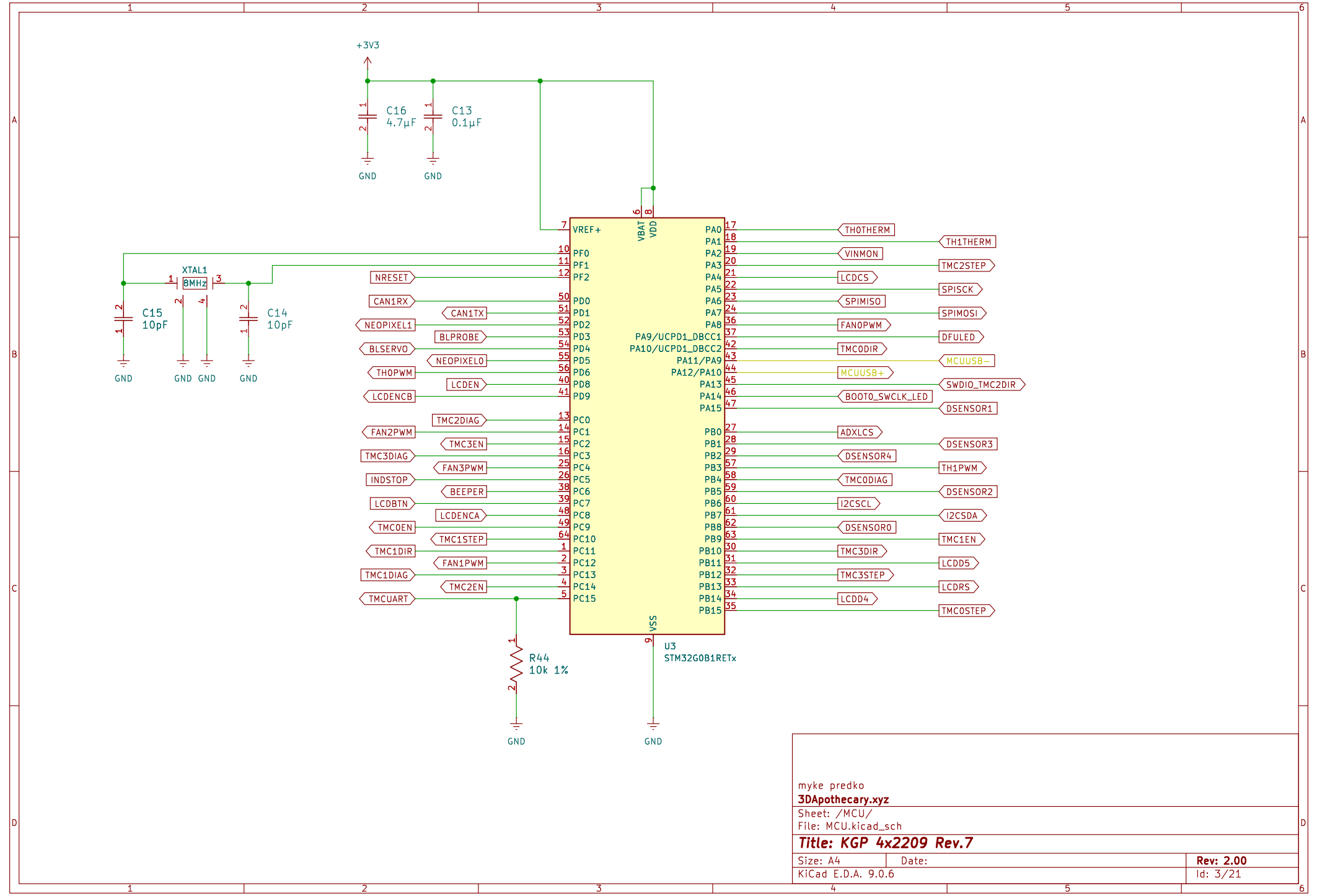
Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 2/21



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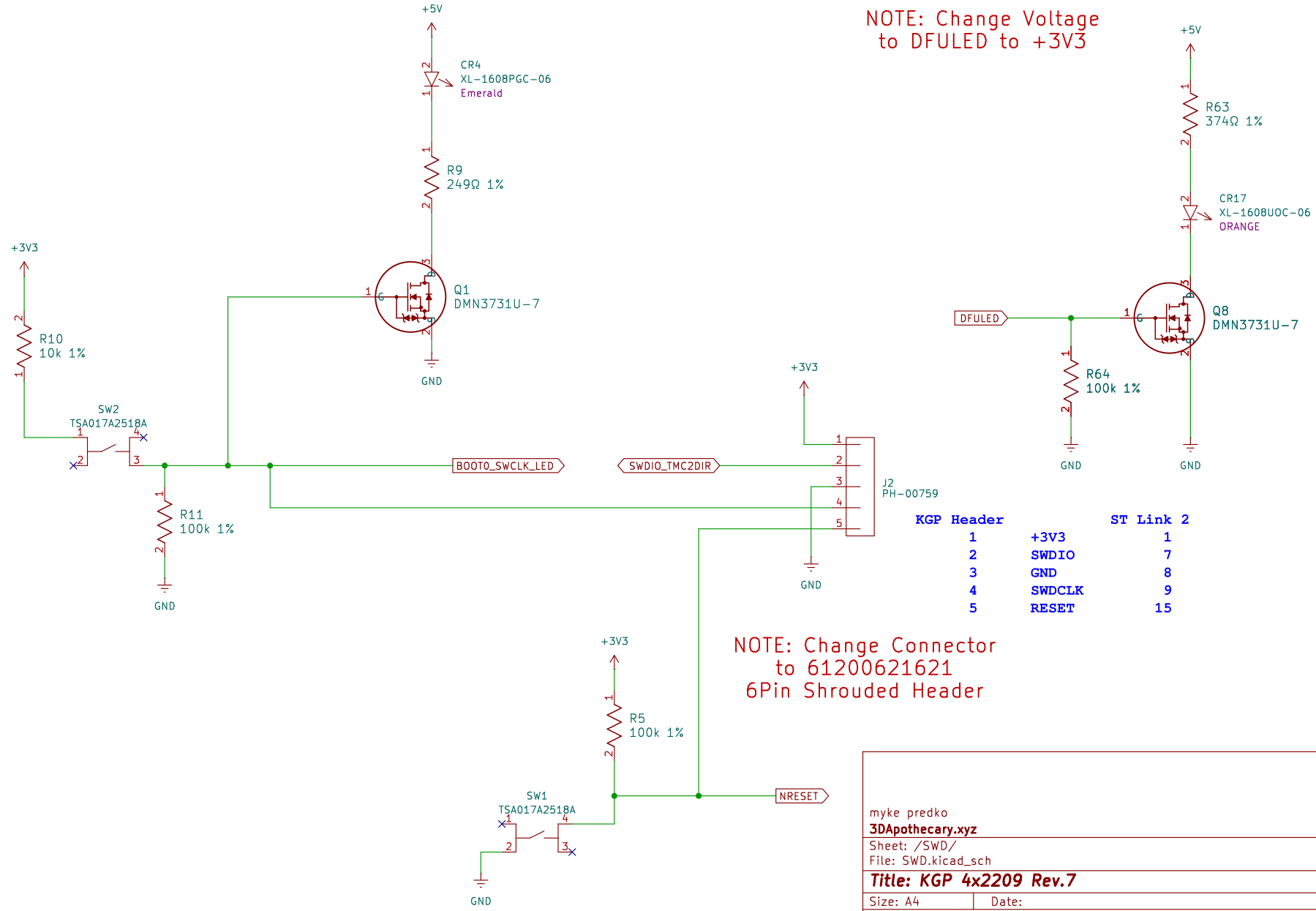
Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 3/21



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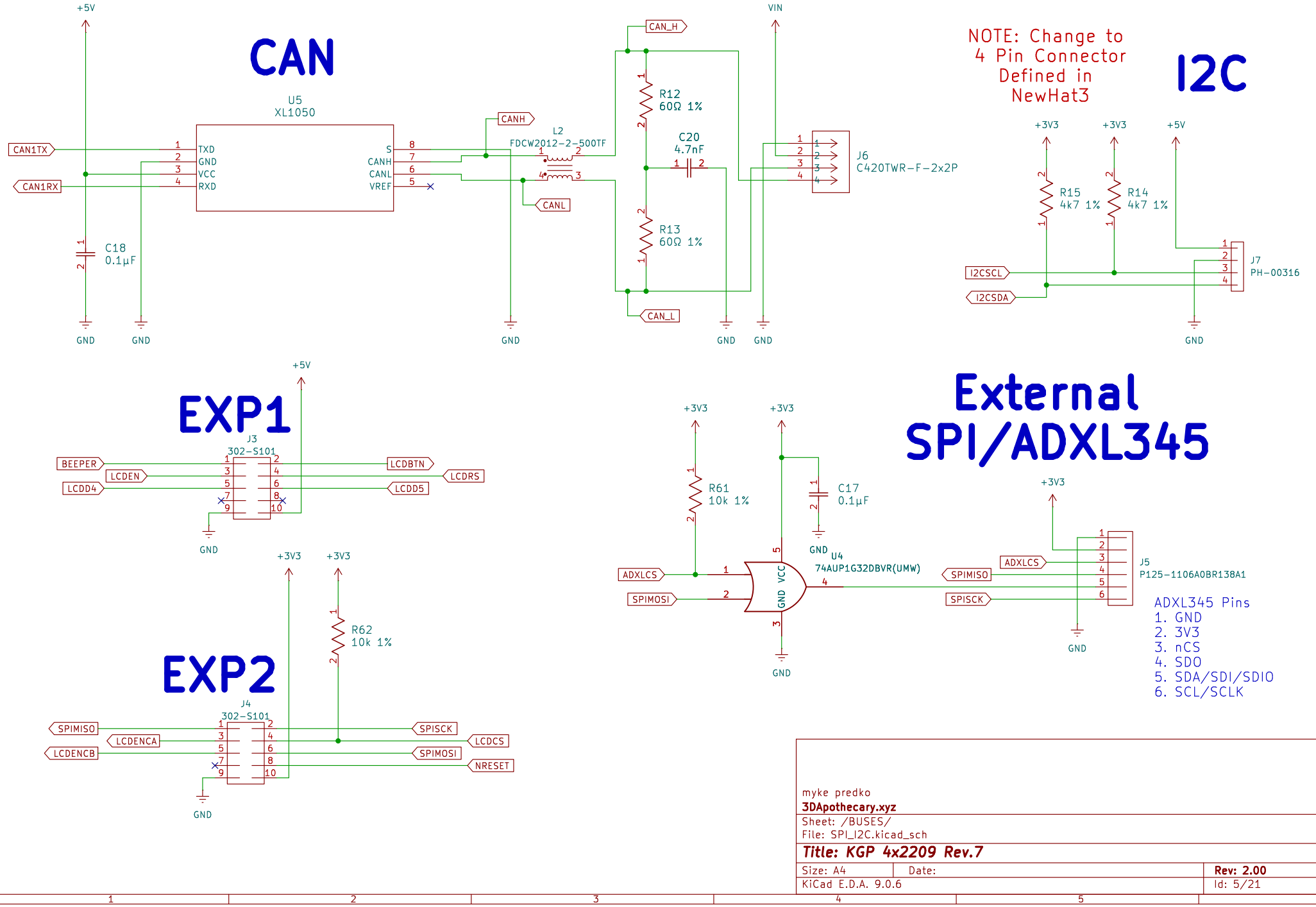
Sheet: /SWD/
File: SWD.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 4/21



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Sheet: /BUSES/
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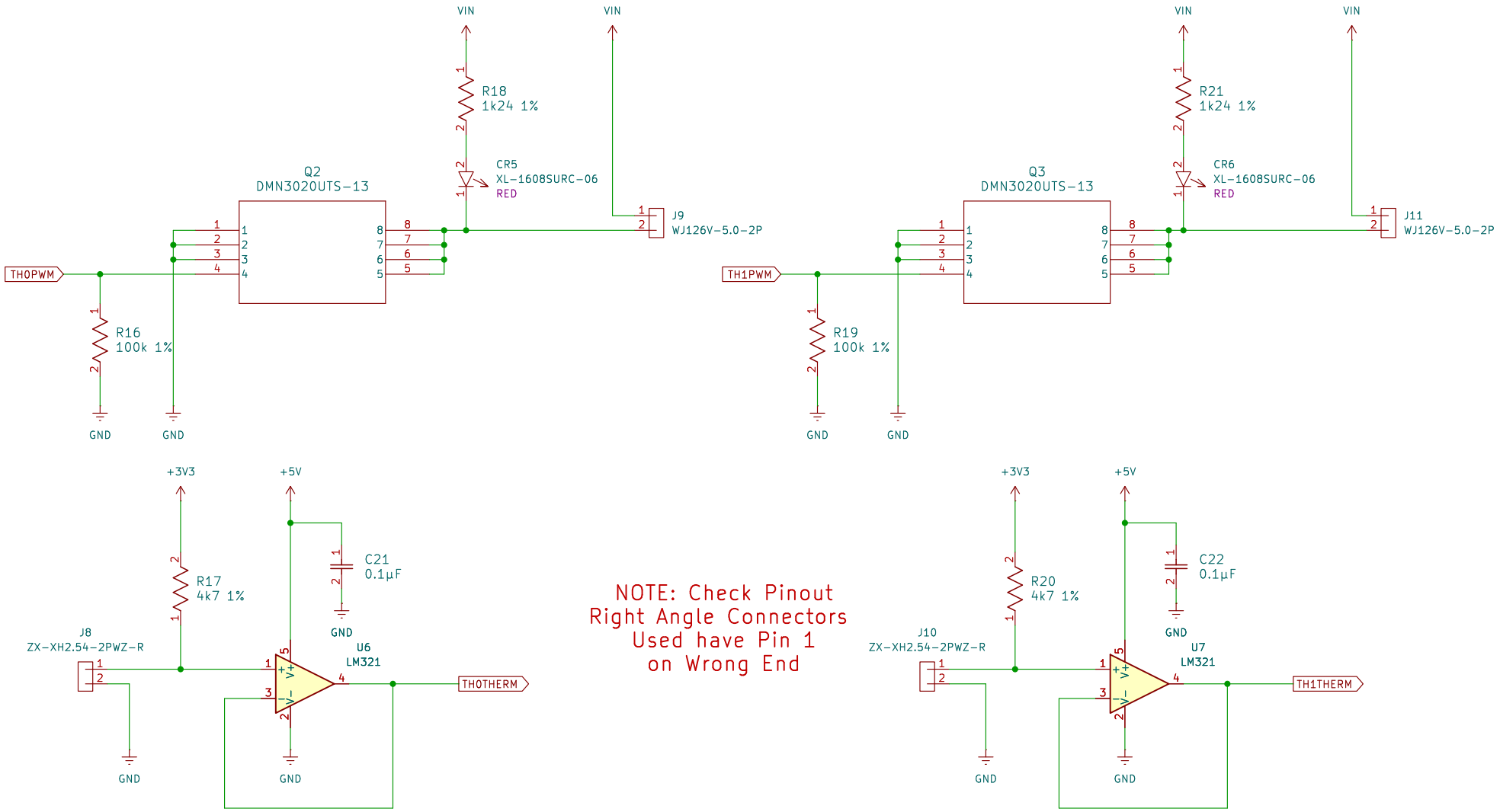
Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 5/21



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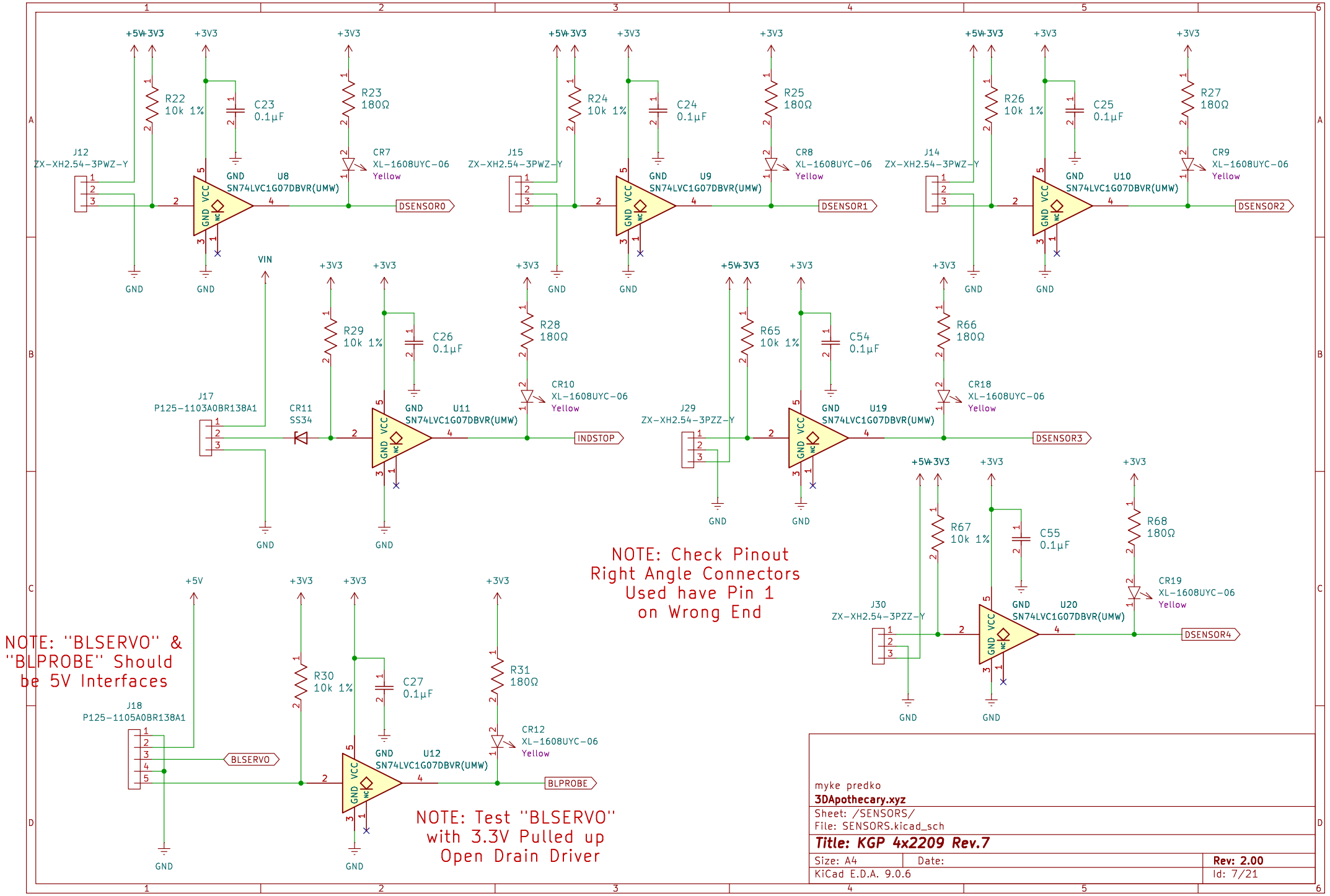
Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 6/21


+5V +3V3
R22 10k 1%
C23 0.1µF
R23 180Ω
J12 ZX-XH2.54-3PWZ-Y
CR7 XL-1608UYC-06 Yellow
GND U8 SN74LVC1G07DBVR(UMW)
DSENSOR0
R24 10k 1%
C24 0.1µF
R25 180Ω
J15 ZX-XH2.54-3PWZ-Y
CR8 XL-1608UYC-06 Yellow
GND U9 SN74LVC1G07DBVR(UMW)
DSENSOR1
R26 10k 1%
C25 0.1µF
R27 180Ω
J14 ZX-XH2.54-3PWZ-Y
CR9 XL-1608UYC-06 Yellow
GND U10 SN74LVC1G07DBVR(UMW)
DSENSOR2
VIN
R29 10k 1%
C26 0.1µF
R28 180Ω
J17 P125-1103A0BR138A1
CR11 SS34
CR10 XL-1608UYC-06 Yellow
GND U11 SN74LVC1G07DBVR(UMW)
INDSTOP
R65 10k 1%
C54 0.1µF
R66 180Ω
J29 ZX-XH2.54-3PZZ-Y
CR18 XL-1608UYC-06 Yellow
GND U19 SN74LVC1G07DBVR(UMW)
DSENSOR3
R67 10k 1%
C55 0.1µF
R68 180Ω
J30 ZX-XH2.54-3PZZ-Y
CR19 XL-1608UYC-06 Yellow
GND U20 SN74LVC1G07DBVR(UMW)
DSENSOR4
NOTE: Check Pinout
Right Angle Connectors
Used have Pin 1
on Wrong End
NOTE: "BLSERVO" &
"BLPROBE" Should
be 5V Interfaces
+5V
R30 10k 1%
C27 0.1µF
R31 180Ω
J18 P125-1105A0BR138A1
BLSERVO
CR12 XL-1608UYC-06 Yellow
GND U12 SN74LVC1G07DBVR(UMW)
BLPROBE
NOTE: Test "BLSERVO"
with 3.3V Pulled up
Open Drain Driver
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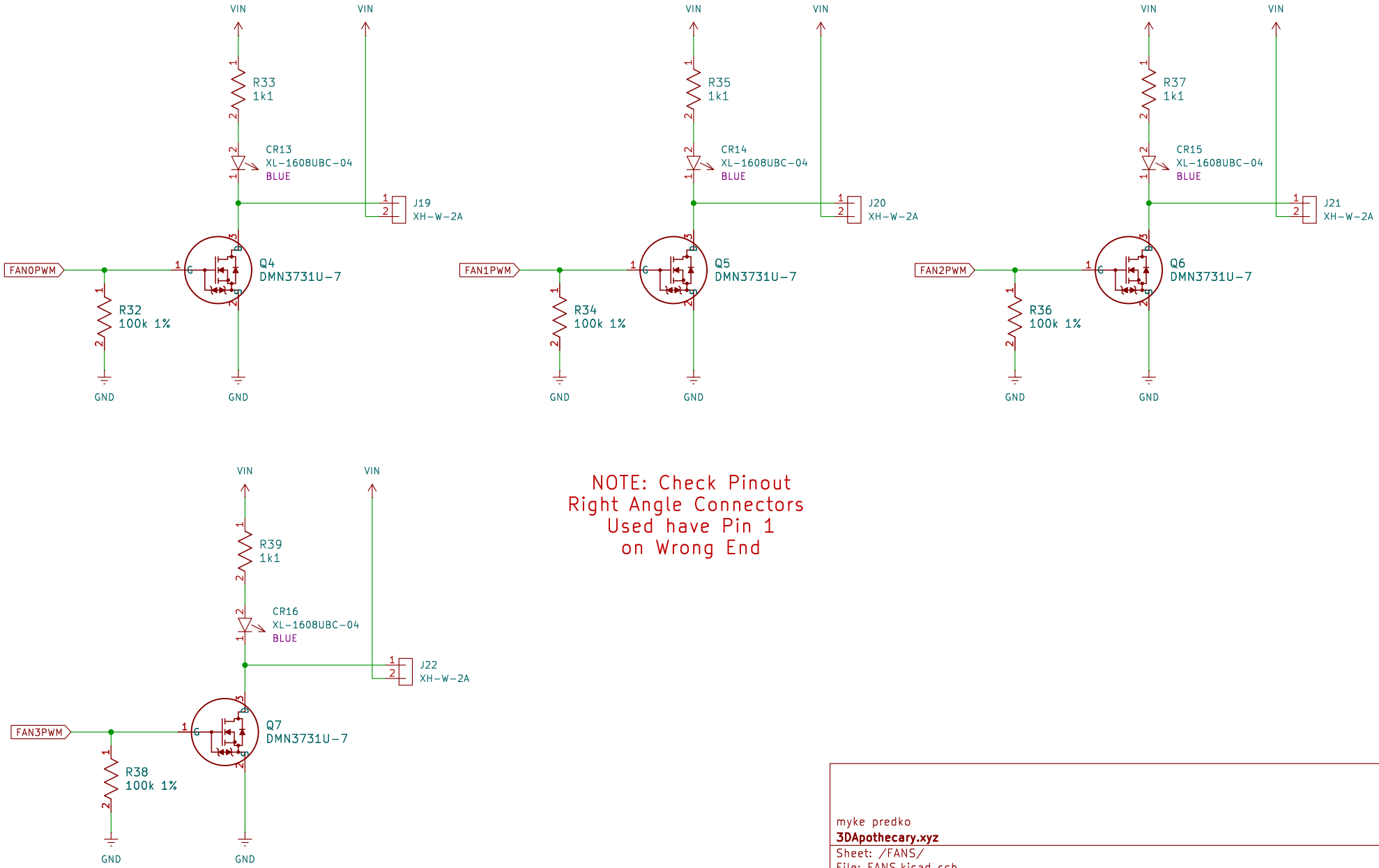
Sheet: /SENSORS/
File: SENSORS.kicad_sch
Title: KGP 4x2209 Rev.7
Size: A4
Date:
Rev: 2.00
KiCad E.D.A. 9.0.6
Id: 7/21



NOTE: Check Pinout
Right Angle Connectors
Used have Pin 1
on Wrong End

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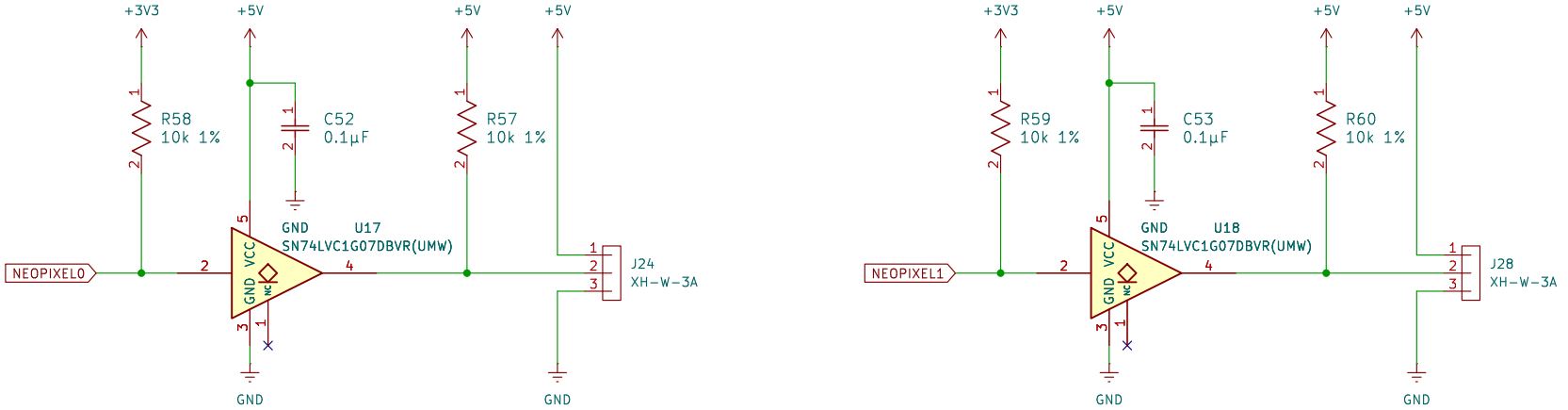
Sheet: /FANS/
File: FANS.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 8/21



NOTE: Check Pinout
Right Angle Connectors
Used have Pin 1
on Wrong End

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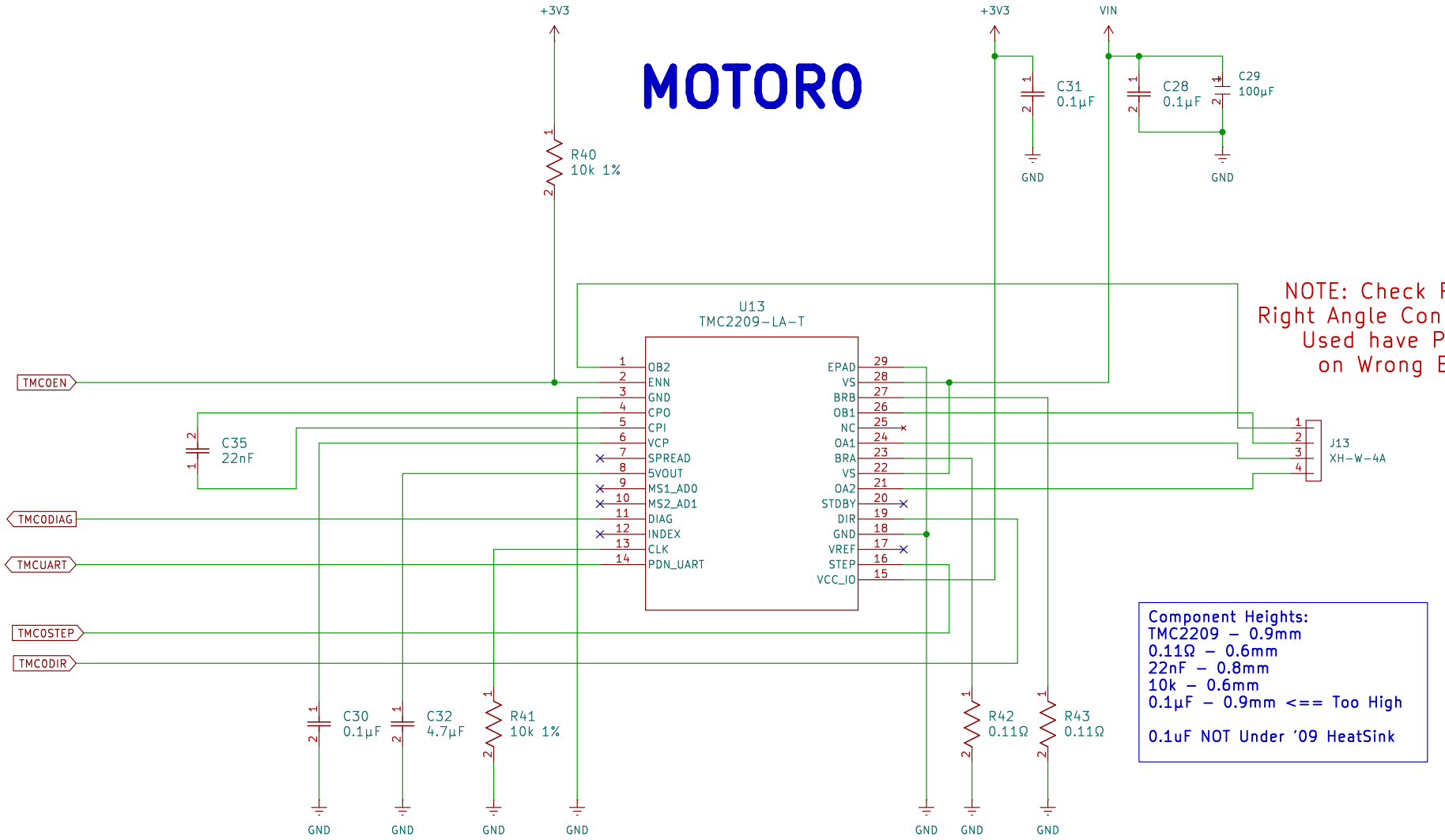
Sheet: /3DACC/
File: 3DACC.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 9/21


MOTOR0
+3V3
R40
10k 1%
+3V3
VIN
C31
0.1µF
GND
C28
0.1µF
C29
100µF
GND
NOTE: Check Pinout
Right Angle Connectors
Used have Pin 1
on Wrong End
U13
TMC2209-LA-T
OB2
ENN
GND
CPO
CPI
VCP
SPREAD
5VOUT
MS1_AD0
MS2_AD1
DIAG
INDEX
CLK
PDN_UART
EPAD
VS
BRB
OB1
NC
OA1
BRA
VS
OA2
STDBY
DIR
GND
VREF
STEP
VCC_IO
TMC0EN
TMC0DIAG
TMCUART
TMC0STEP
TMC0DIR
C35
22nF
J13
XH-W-4A
C30
0.1µF
C32
4.7µF
R41
10k 1%
R42
0.11Ω
R43
0.11Ω
GND
Component Heights:
TMC2209 – 0.9mm
0.11Ω – 0.6mm
22nF – 0.8mm
10k – 0.6mm
0.1µF – 0.9mm <== Too High
0.1uF NOT Under '09 HeatSink
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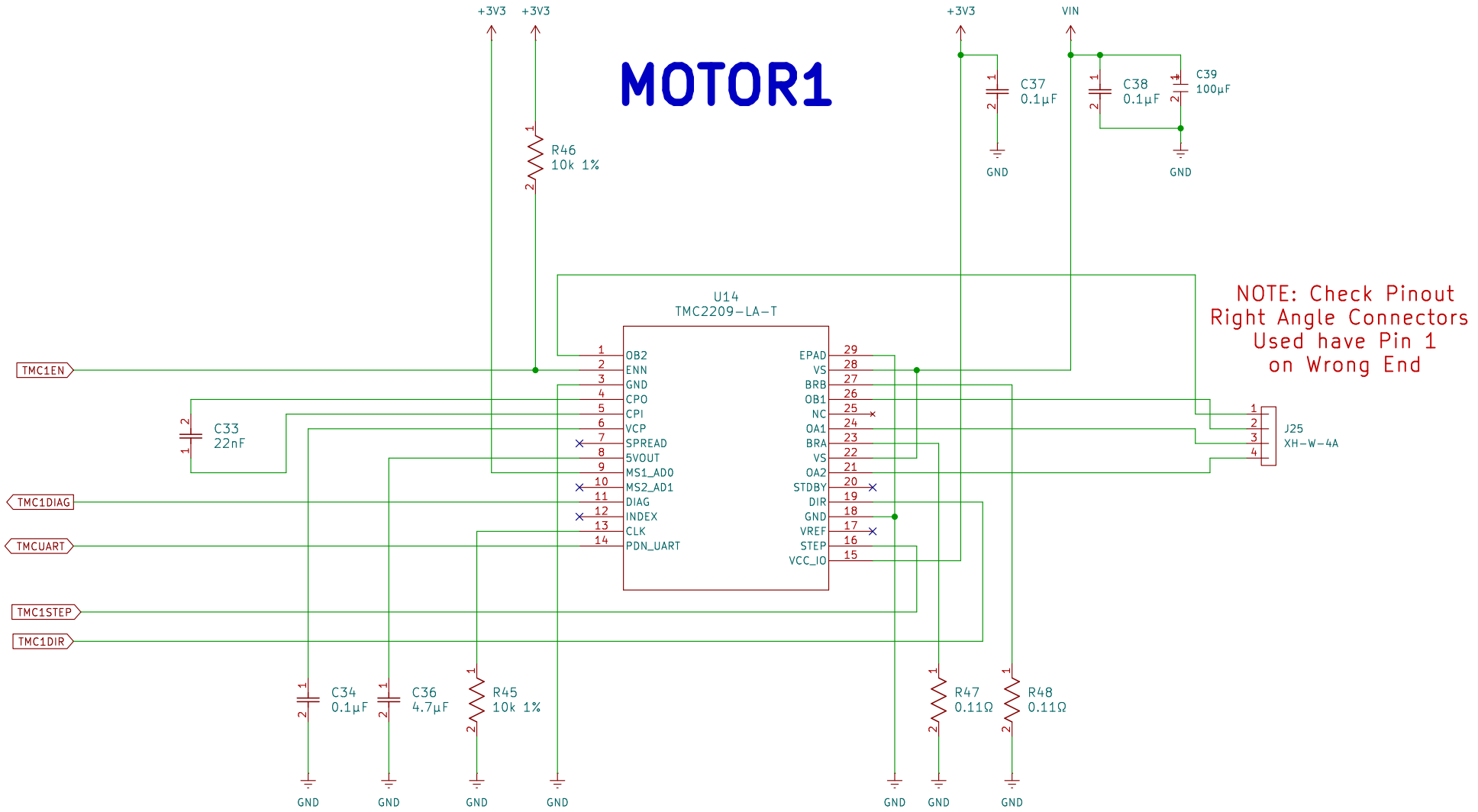
Sheet: /MOTOR_0/
File: MOTOR_0.kicad_sch
Title: KGP 4x2209 Rev.7
Size: A4
Date:
Rev: 2.00
KiCad E.D.A. 9.0.6
Id: 10/21



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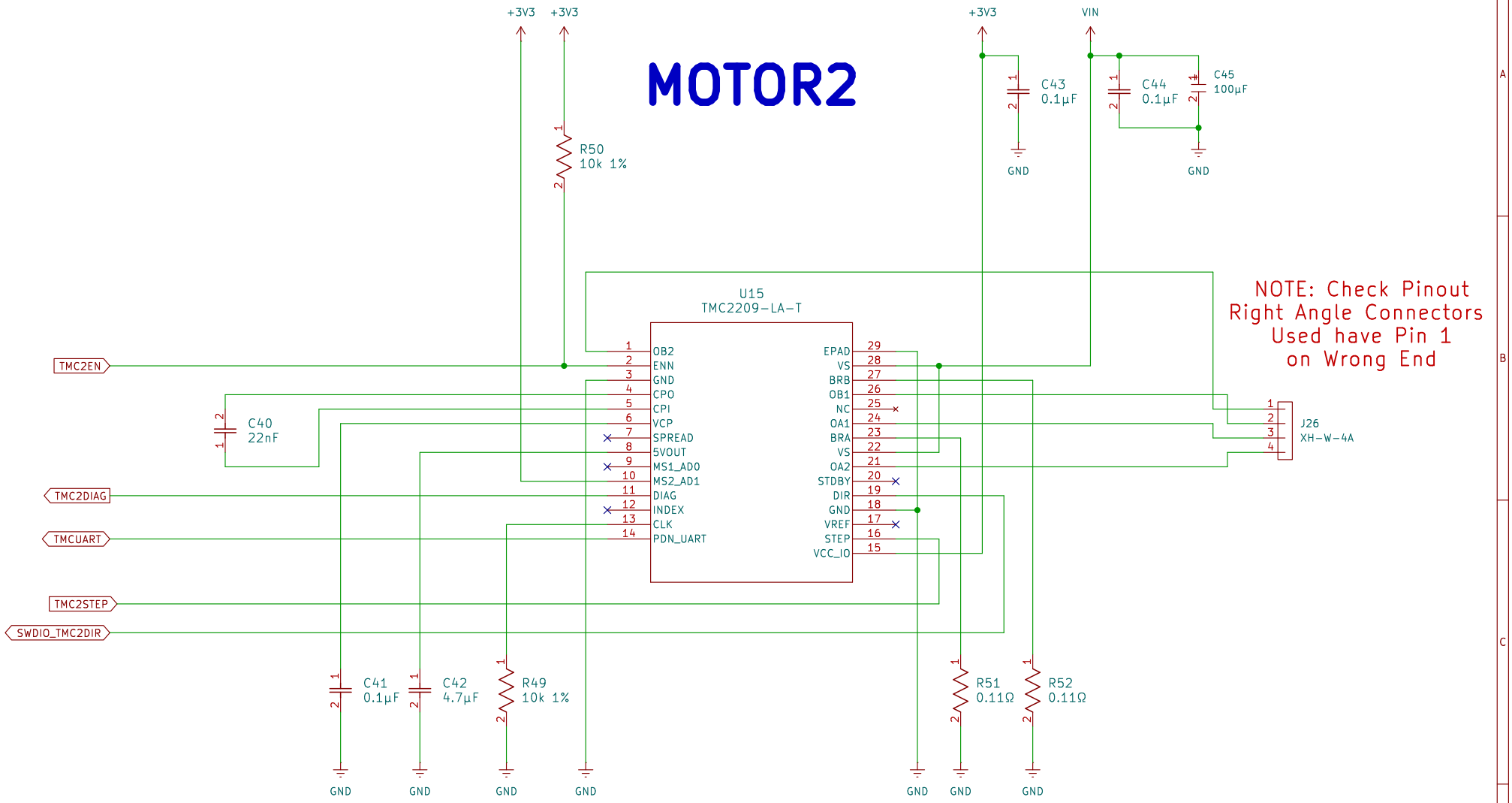
Sheet: /MOTOR_1/
File: MOTOR_1.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 11/21



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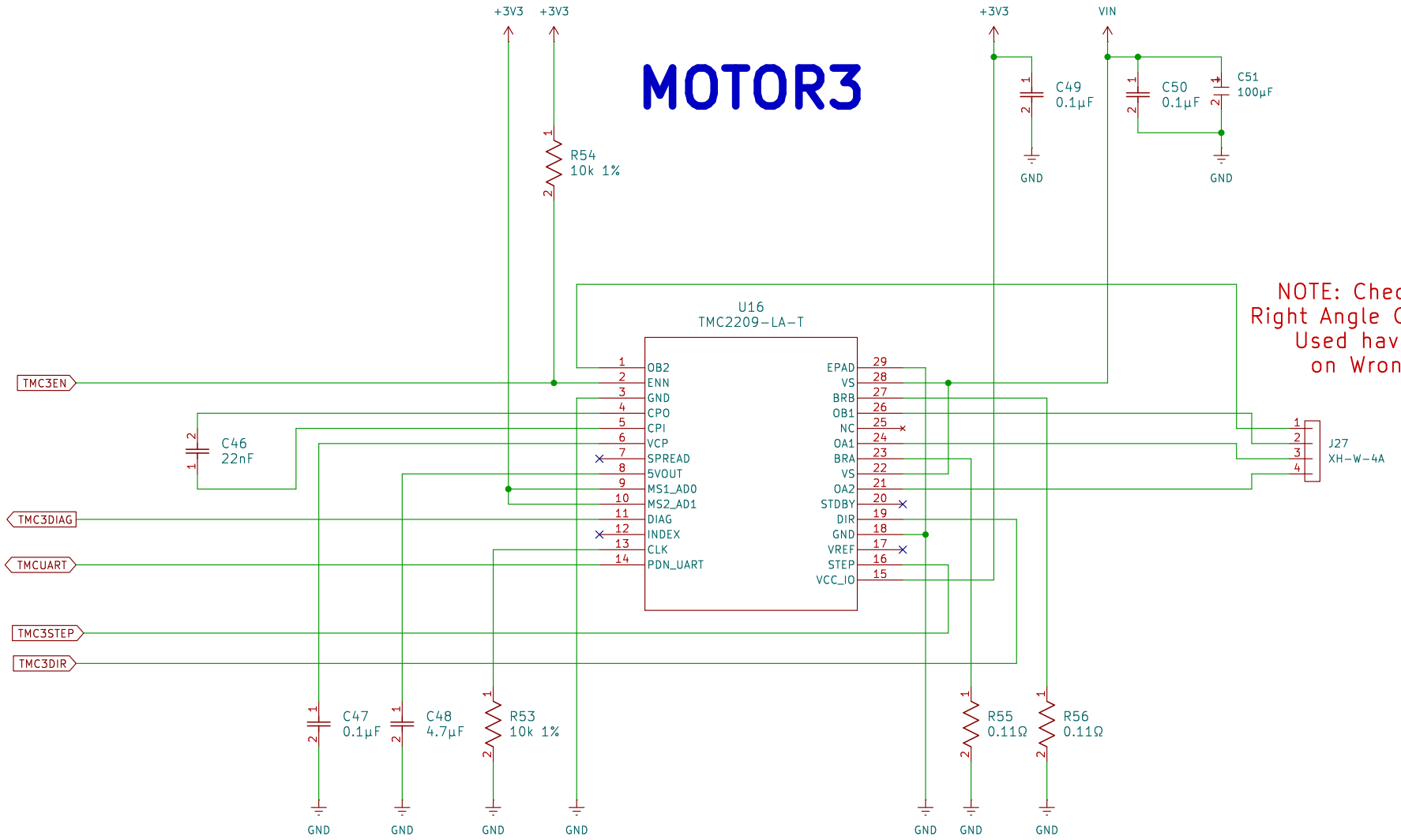
Sheet: /MOTOR_2/
File: MOTOR_2.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 12/21



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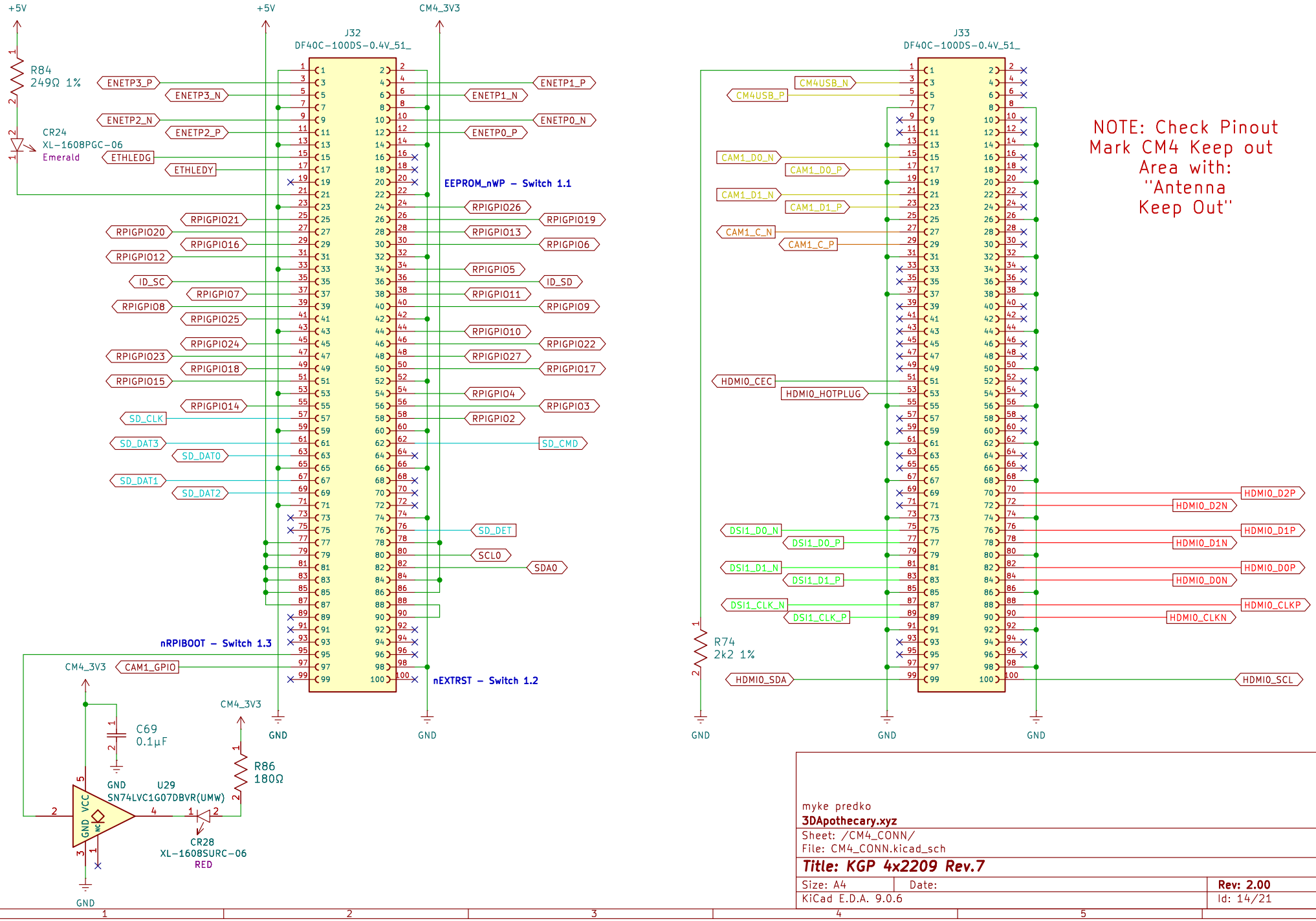
Sheet: /MOTOR_3/
File: MOTOR_3.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 13/21


+5V
R84
249Ω 1%
CR24
XL-1608PGC-06
Emerald
ETHLEDG
ETHLEDY
J32
DF40C-100DS-0.4V_51_
ENETP3_P
ENETP3_N
ENETP2_N
ENETP2_P
ENETP1_P
ENETP1_N
ENETP0_N
ENETP0_P
EEPROM_nWP – Switch 1.1
RPIGPIO21
RPIGPIO20
RPIGPIO16
RPIGPIO12
ID_SC
RPIGPIO7
RPIGPIO8
RPIGPIO25
RPIGPIO24
RPIGPIO23
RPIGPIO18
RPIGPIO15
RPIGPIO14
SD_CLK
SD_DAT3
SD_DAT0
SD_DAT1
SD_DAT2
RPIGPIO26
RPIGPIO13
RPIGPIO5
ID_SD
RPIGPIO11
RPIGPIO10
RPIGPIO27
RPIGPIO4
RPIGPIO2
SD_CMD
SD_DET
SCL0
SDA0
RPIGPIO19
RPIGPIO6
RPIGPIO9
RPIGPIO22
RPIGPIO17
RPIGPIO3
nRPIBOOT – Switch 1.3
CM4_3V3
CAM1_GPIO
nEXTRST – Switch 1.2
GND
C69
0.1µF
R86
180Ω
U29
SN74LVC1G07DBVR(UMW)
CR28
XL-1608SURC-06
RED
J33
DF40C-100DS-0.4V_51_
CM4USB_N
CM4USB_P
CAM1_D0_N
CAM1_D0_P
CAM1_D1_N
CAM1_D1_P
CAM1_C_N
CAM1_C_P
HDMI0_CEC
HDMI0_HOTPLUG
DSI1_D0_N
DSI1_D0_P
DSI1_D1_N
DSI1_D1_P
DSI1_CLK_N
DSI1_CLK_P
HDMI0_SDA
HDMI0_D2P
HDMI0_D2N
HDMI0_D1P
HDMI0_D1N
HDMI0_D0P
HDMI0_D0N
HDMI0_CLKP
HDMI0_CLKN
HDMI0_SCL
R74
2k2 1%
NOTE: Check Pinout
Mark CM4 Keep out
Area with:
"Antenna
Keep Out"
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Sheet: /CM4_CONN/
File: CM4_CONN.kicad_sch
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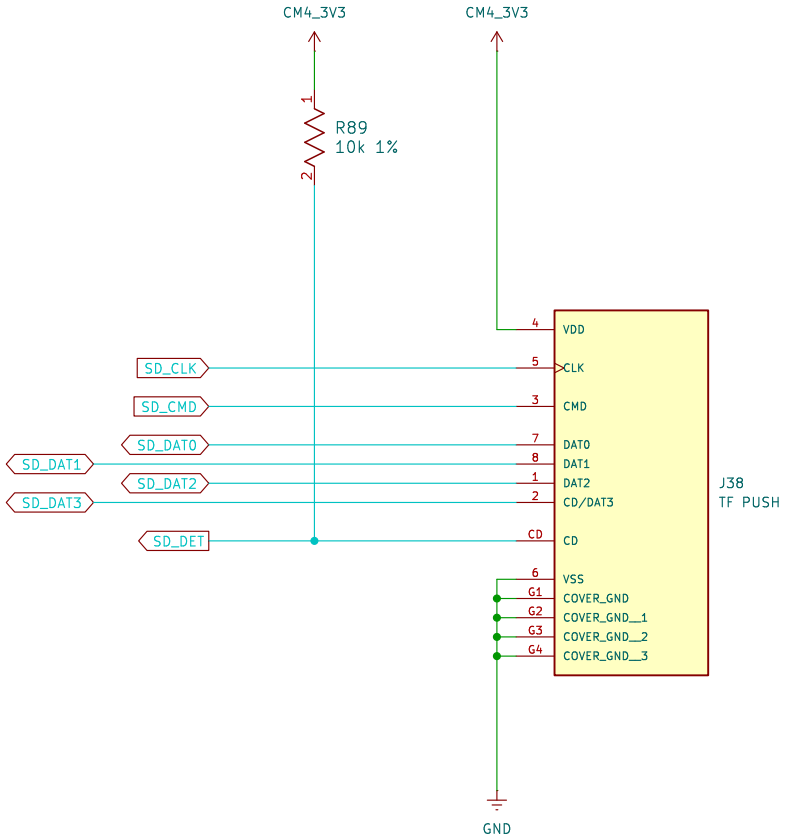
Size: A4
Date:
Rev: 2.00
KiCad E.D.A. 9.0.6
Id: 14/21



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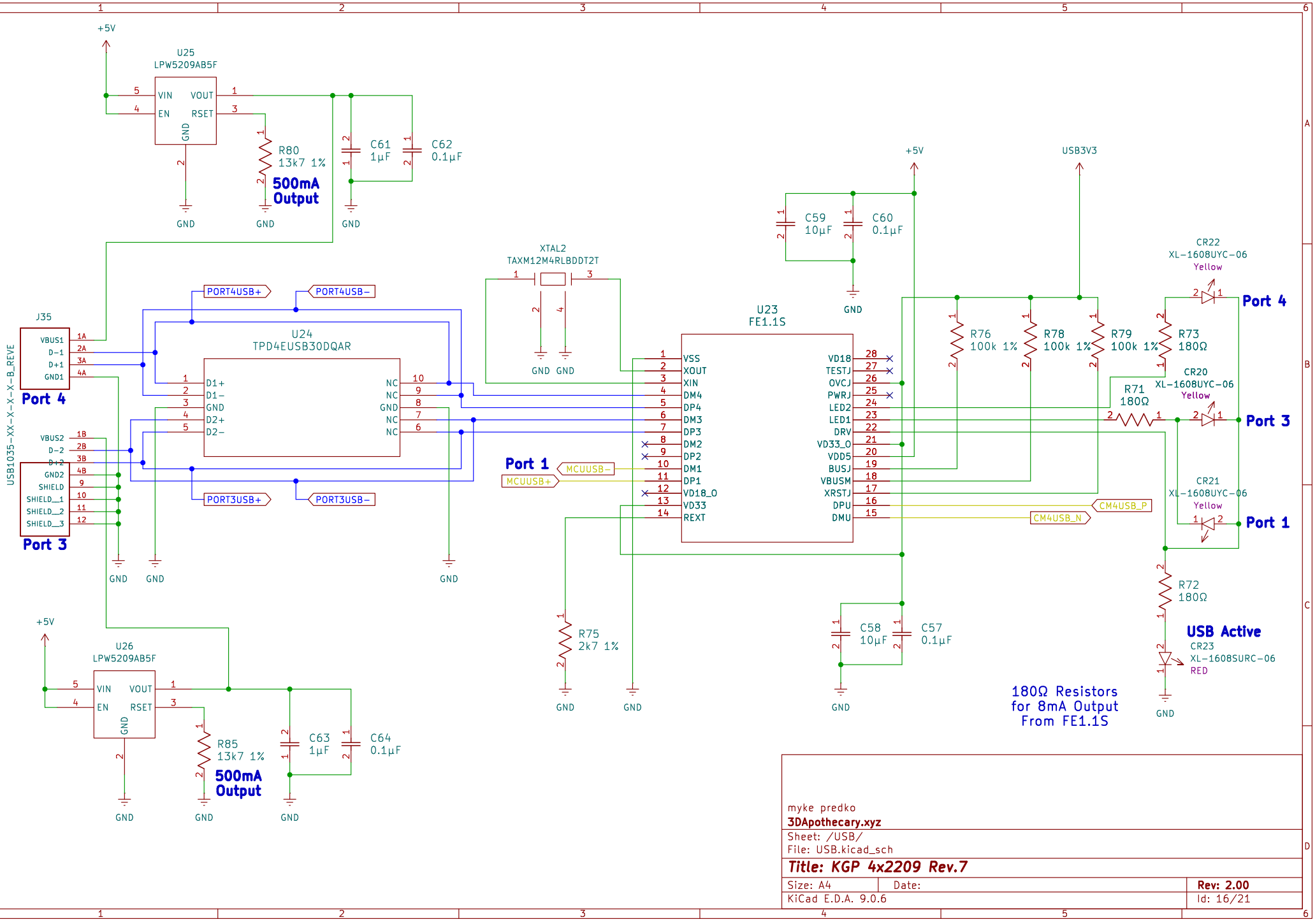
Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 15/21


+5V
U25
LPW5209AB5F
VIN
VOUT
EN
RSET
GND
R80
13k7 1%
500mA
Output
C61
1µF
C62
0.1µF
GND
XTAL2
TAXM12M4RLBDDT2T
GND GND
U23
FE1.1S
VSS
XOUT
XIN
DM4
DP4
DM3
DP3
DM2
DP2
DM1
DP1
VD18_O
VD33
REXT
VD18
TESTJ
OVCJ
PWRJ
LED2
LED1
DRV
VD33_O
VDD5
BUSJ
VBUSM
XRSTJ
DPU
DMU
C59
10µF
C60
0.1µF
USB3V3
R76
100k 1%
R78
100k 1%
R79
100k 1%
R73
180Ω
R71
180Ω
CR22
XL-1608UYC-06
Yellow
Port 4
CR20
XL-1608UYC-06
Yellow
Port 3
CR21
XL-1608UYC-06
Yellow
Port 1
R72
180Ω
USB Active
CR23
XL-1608SURC-06
RED
J35
VBUS1
D-1
D+1
GND1
Port 4
USB1035-XX-X-X-X-B_REVE
VBUS2
D-2
D+2
GND2
SHIELD
SHIELD_1
SHIELD_2
SHIELD_3
Port 3
U24
TPD4EUSB30DQAR
D1+
D1-
GND
D2+
D2-
NC
PORT4USB+
PORT4USB-
PORT3USB+
PORT3USB-
Port 1
MCUUSB-
MCUUSB+
CM4USB_P
CM4USB_N
R75
2k7 1%
C58
10µF
C57
0.1µF
180Ω Resistors
for 8mA Output
From FE1.1S
U26
LPW5209AB5F
R85
13k7 1%
500mA
Output
C63
1µF
C64
0.1µF
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Sheet: /USB/
File: USB.kicad_sch
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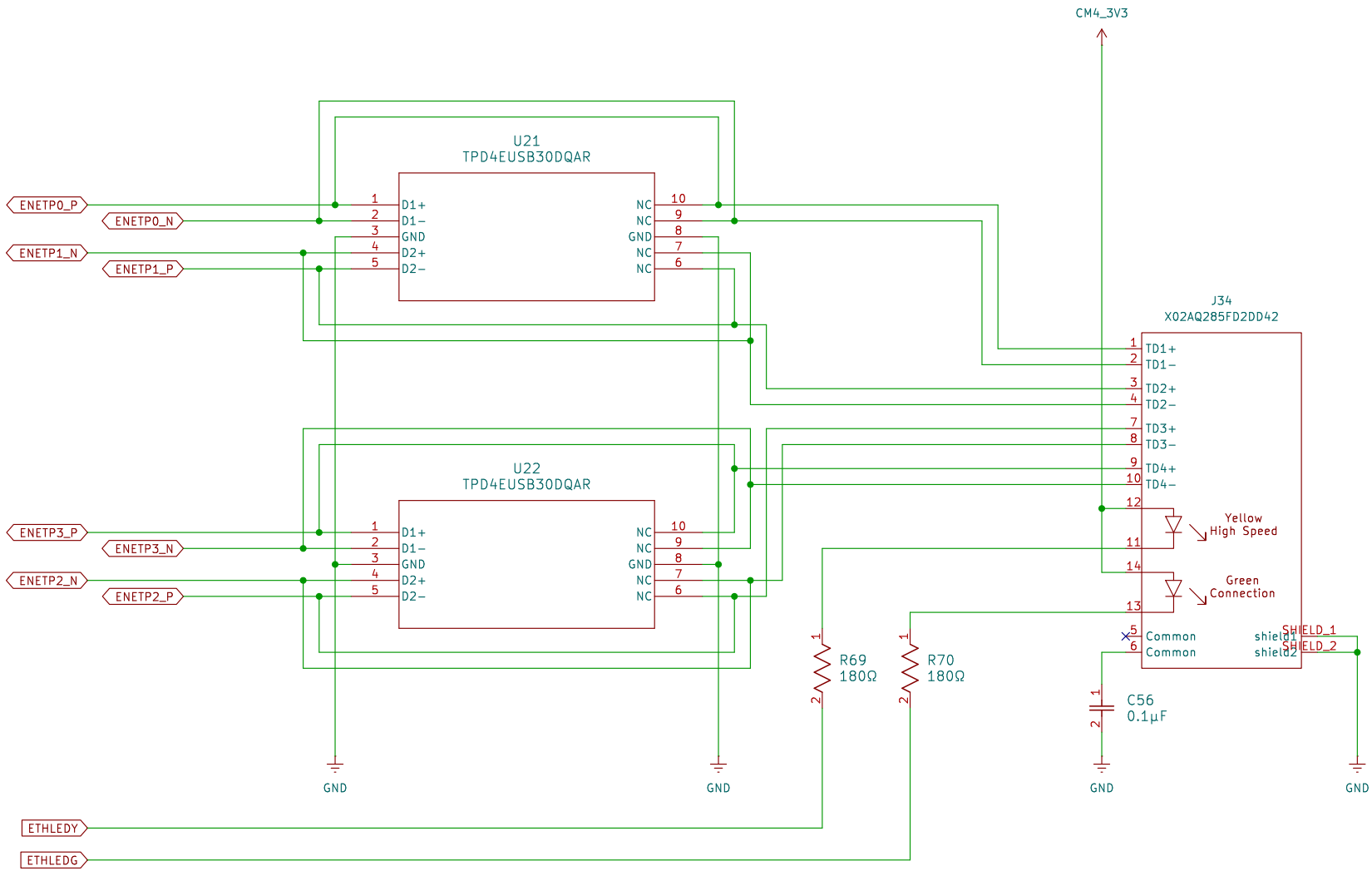
Size: A4
Date:
Rev: 2.00
KiCad E.D.A. 9.0.6
Id: 16/21



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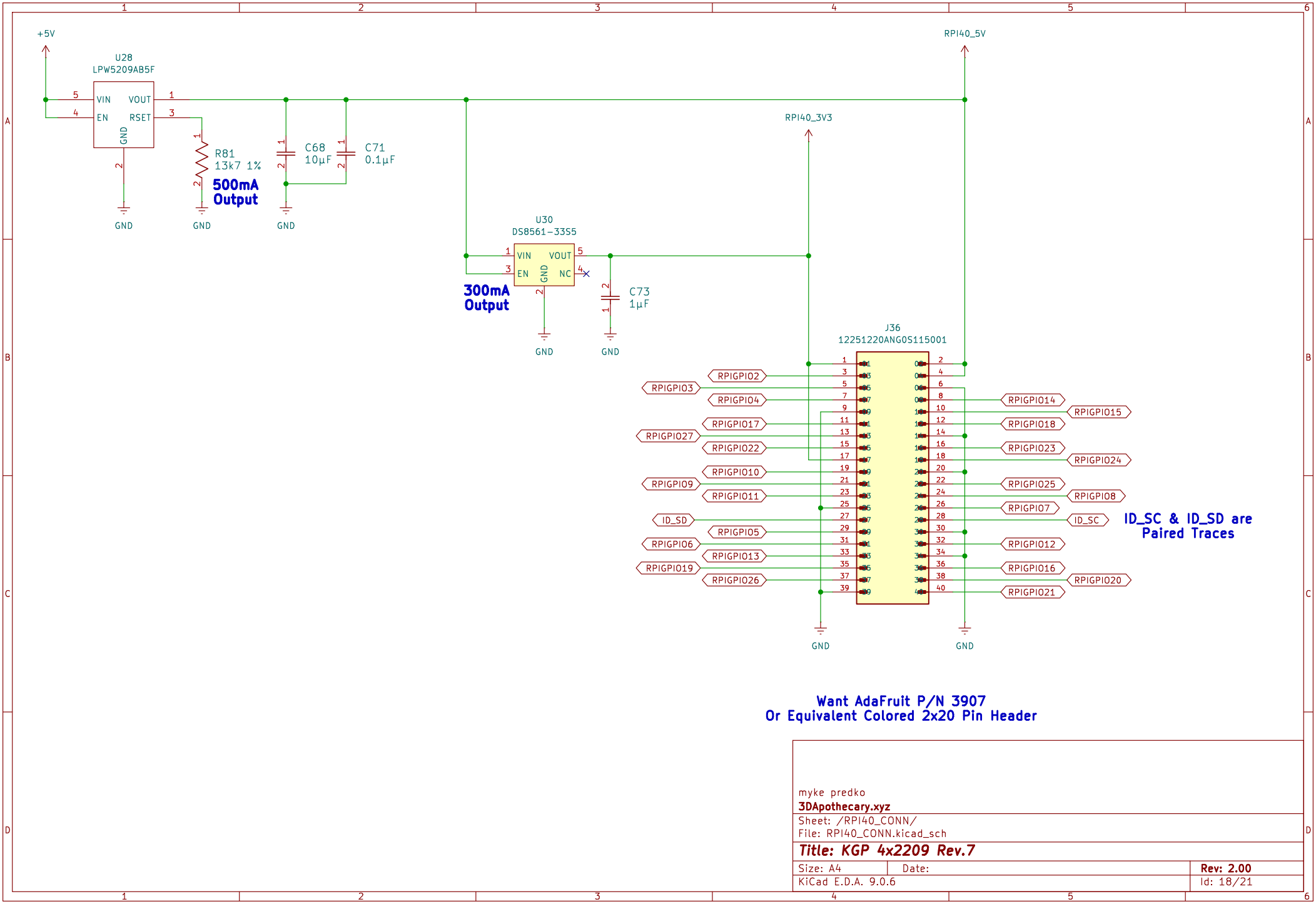
Sheet: /ETHERNET/
File: ETHERNET.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 17/21



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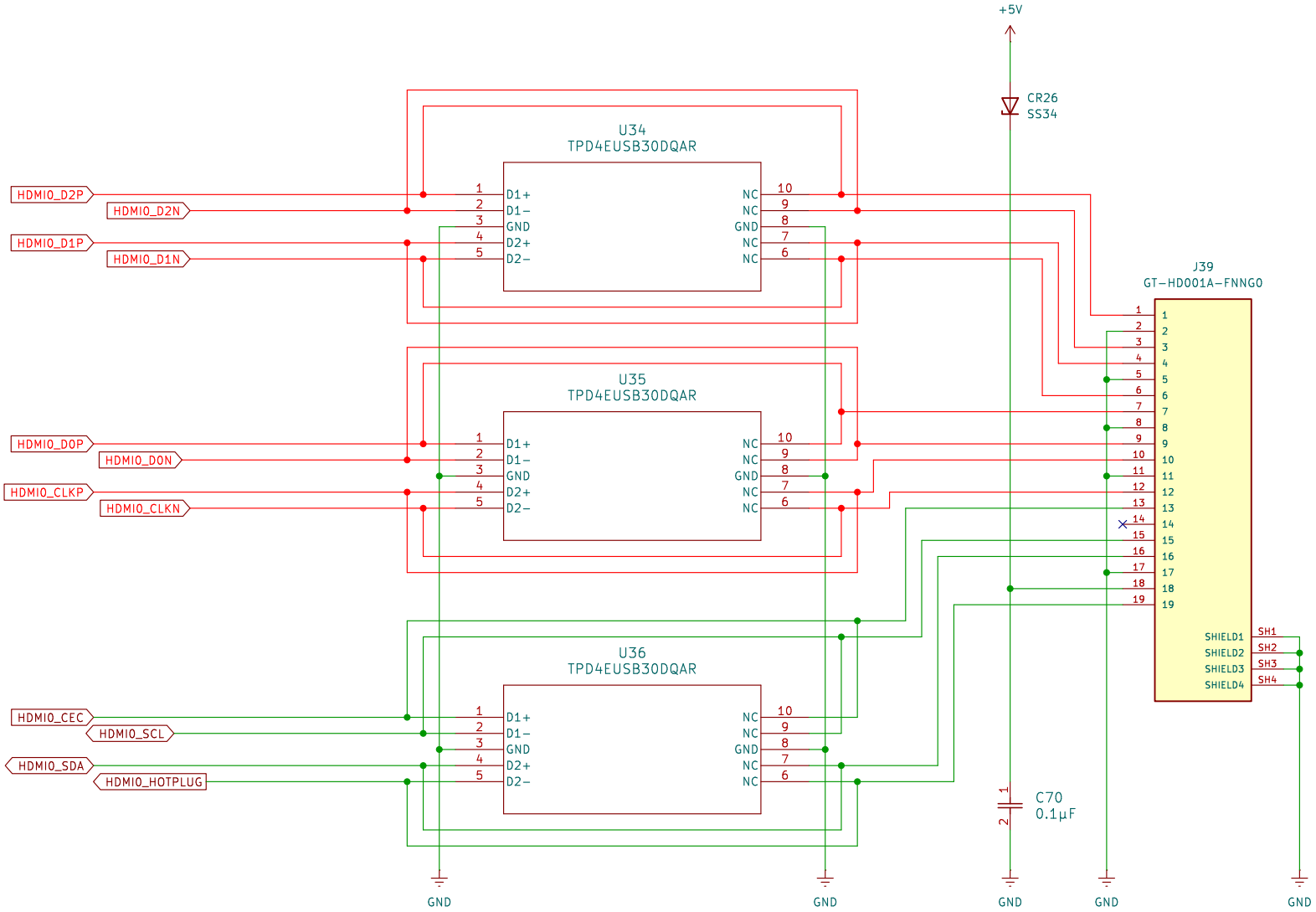
Sheet: /RPI40_CONN/
File: RPI40_CONN.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 18/21



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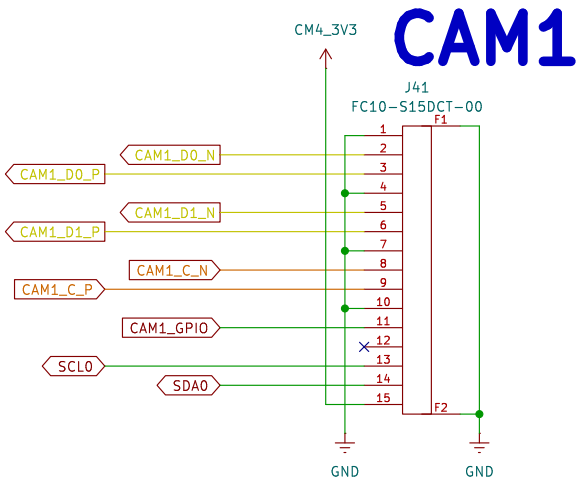
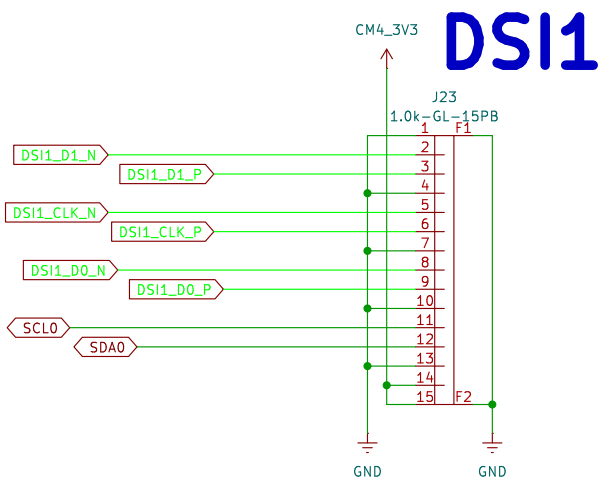
Sheet: /HDMI0/
File: HDMI0.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 19/21





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Sheet: /CAM1_DSI1/
File: CAM1_DSI1.kicad_sch

Title: KGP 4x2209 Rev.7

Size: A4	Date:	**Rev: 2.00**
KiCad E.D.A. 9.0.6		Id: 20/21

Notes:

1. ST Indicates that the Pull Up on Reset (R10) for the STM32G0B1 is NOT REQUIRED. Remove and test board operation without it (Including SWD Operation).
2. Need Part Number of Coloured 40Pin Raspberry Pi Connector

Changes from Rev.5:

1. Moved R10 from inline to MCU SWCLK to BOOT0 Switch +3V3 Connection
2. Change all 100k Resistors to 100k 1%
3. Corrected Ethernet LED Polarity
4. Changed Standoff Manufacturer and Part Number
5. Removed R77, C66 & C67
6. EXP2 Silkscreen Incorrectly Noted Pin 6 as "MISO"/Corrected to "MOSI"
7. Remove U27 to allow UC1701 Display to work without extra printer.cfg statements
8. "ADXLCS" Pin is incorrectly marked as "PD0" on Topside Silk/Should be "PB0"
9. USB Pin Information Moved Closer to 2x USB A Socket Housing
10. Corrected TMC1STEP to "PC10" on Backside Silkscreen/"PB10" was wrong
11. BLTouch "PROBE" Pin Changed to "PD3" on Topside Silkscreen/Not "PD5"
12. Moved "VINMON" Pin Silkscreen by MCU
13. Reversed CAM1 Connector Pins
14. Marked DSI1 & CAM1 Connectors with large knockout Label and Pin "1" Indication
15. Added "STM32G0B1" Label Above MCU
16. Marked RPI 40 Pin Connector with a White Knockout "1"
17. Removed J16, 2 Pin 5V/GND Header
18. Replaced U1 & L1 with SY8368A & 2.0µH coil
19. Added Whitespace to open area by SD Card Socket
20. Added "M#" on the inside of each Motor Square on Topside
21. Changed J7 I2C Voltage to 5V/Changed the Silkscreen to Match
22. Eliminated Thermal Reliefs on High-Current Pins
23. Reviewed LED Current Limiting Resistors for 8mA through all LEDs Heater and Fan LEDs' Resistors Specified for VIN = 10V
24. Rev.7: Changed Ethernet Connector to XKB X02AQ285FD2DD42

Mounting Holes

H1 MountingHole
H2 MountingHole
H3 MountingHole
H4 MountingHole

Sinhoo SMTWE2515MTJ 1.5mm High/M2.5 Threaded Standoffs

MP1 M2.5 x 1.5mm SMTWE2515MTJ
MP2 M2.5 x 1.5mm SMTWE2515MTJ
MP3 M2.5 x 1.5mm SMTWE2515MTJ
MP4 M2.5 x 1.5mm SMTWE2515MTJ

Fiducials

FID1 Fiducial
FID2 Fiducial
FID3 Fiducial
FID4 Fiducial

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Sheet: /MISC/
File: MISC.kicad_sch

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