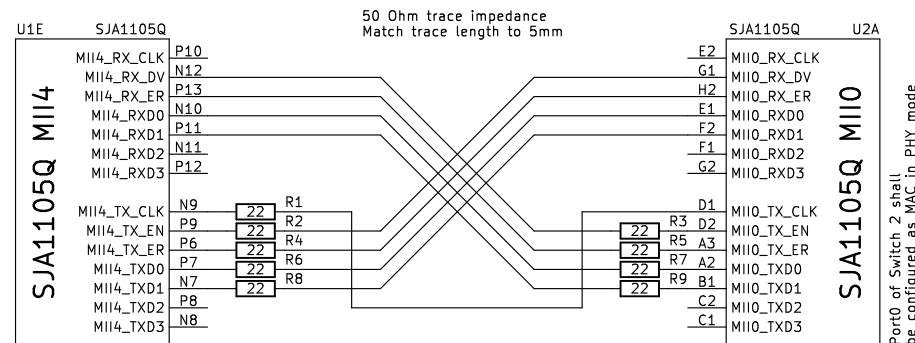
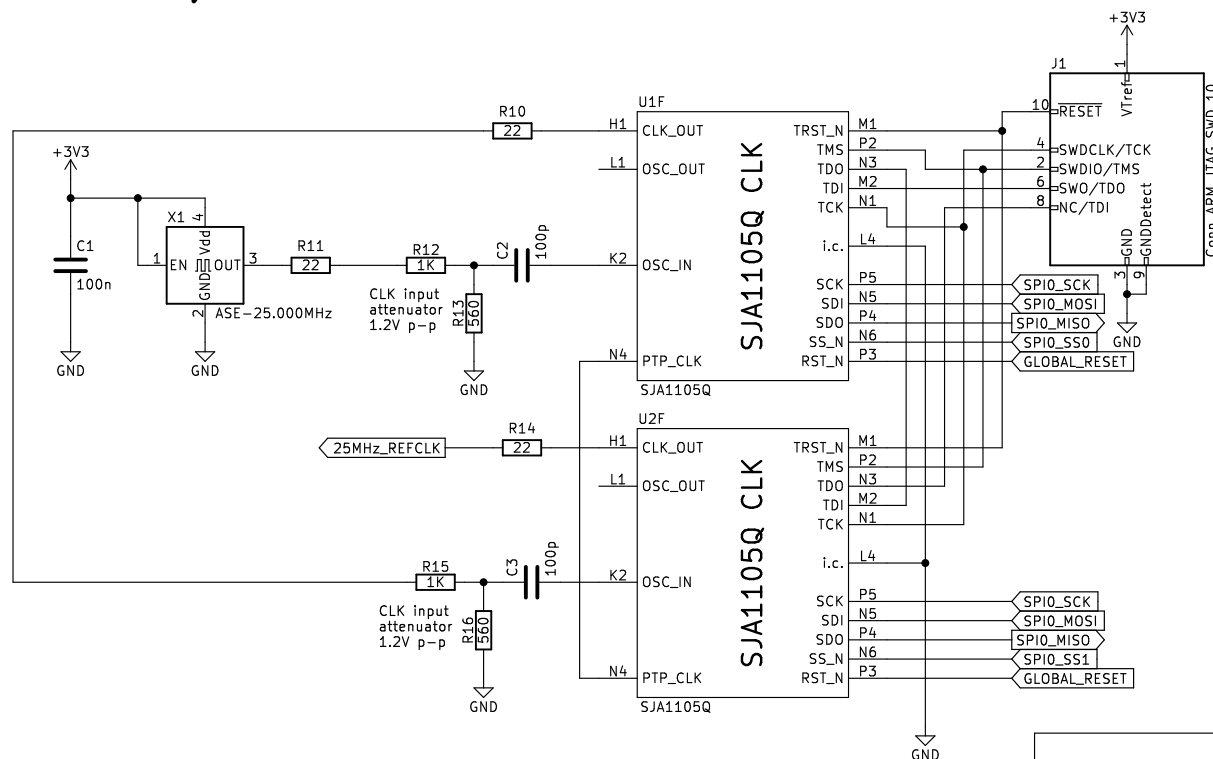


## Inter Switch Connection RMII<-->RMII 100MBit



## Switch Clock Generation / JTAG Debug



Keep clock lines less than 14 cm, according to "1/3 rise time" rule.  
<https://www.altium.com/documentation/altium-designer/interactively-routing-controlled-impedance-pcb>  
 The ASE-25.000MHz has a 2.8ns rise time, hence 0.93ns trace delay, which equals to 14cm trace length on FR4.

[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
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**Peter Heinrich**

Sheet: /SJA1105Q Switch/  
 File: SJA1105Q\_Switch.kicad\_sch

**Title: Open Hardware 10Base-T1L Switch**

Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

**Rev: REV A**

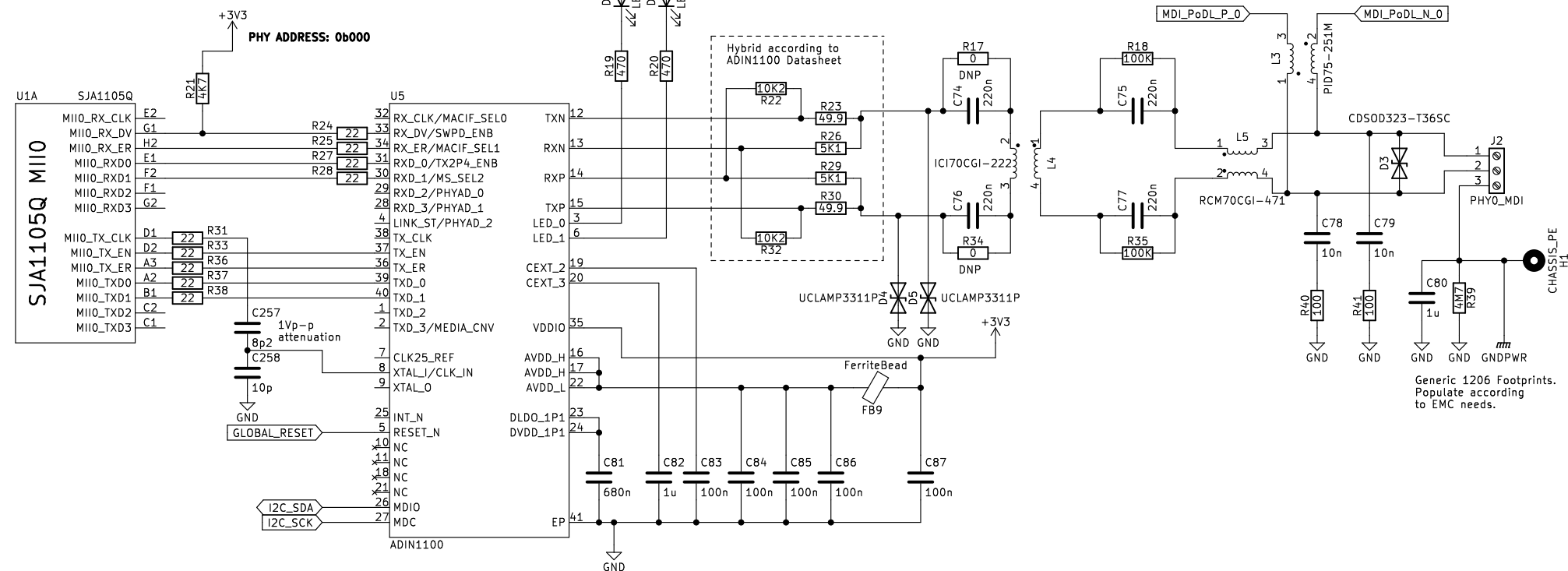
Id: 2/18



Config:  
MACIF\_SEL: 0b00 ==> RMII  
MS\_SEL2: 0b0 ==> Prefer Slave  
TX2P4: 0b0 ==> Enable 1.0V and 2.4V TX  
SWPD\_ENB: 0b1 ==> Do not enter power down

PHY ADDRESS: 0b000

Inductor selection according to:  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>



Further documents considered during design  
<https://www.we-online.com/catalog/media/o341320v410%20ANP085b%20EN.pdf>  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>  
[https://www.ieee802.org/802\\_tutorials/2015-11/PoDL\\_tutorial1115.pdf](https://www.ieee802.org/802_tutorials/2015-11/PoDL_tutorial1115.pdf)

[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
Open Hardware License CERN-OHL-P v2

**Peter Heinrich**

Sheet: /10Base-T1L-PHY0/  
File: 10Base-T1L-PHY0.kicad\_sch

**Title: Open Hardware 10Base-T1L Switch**

Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

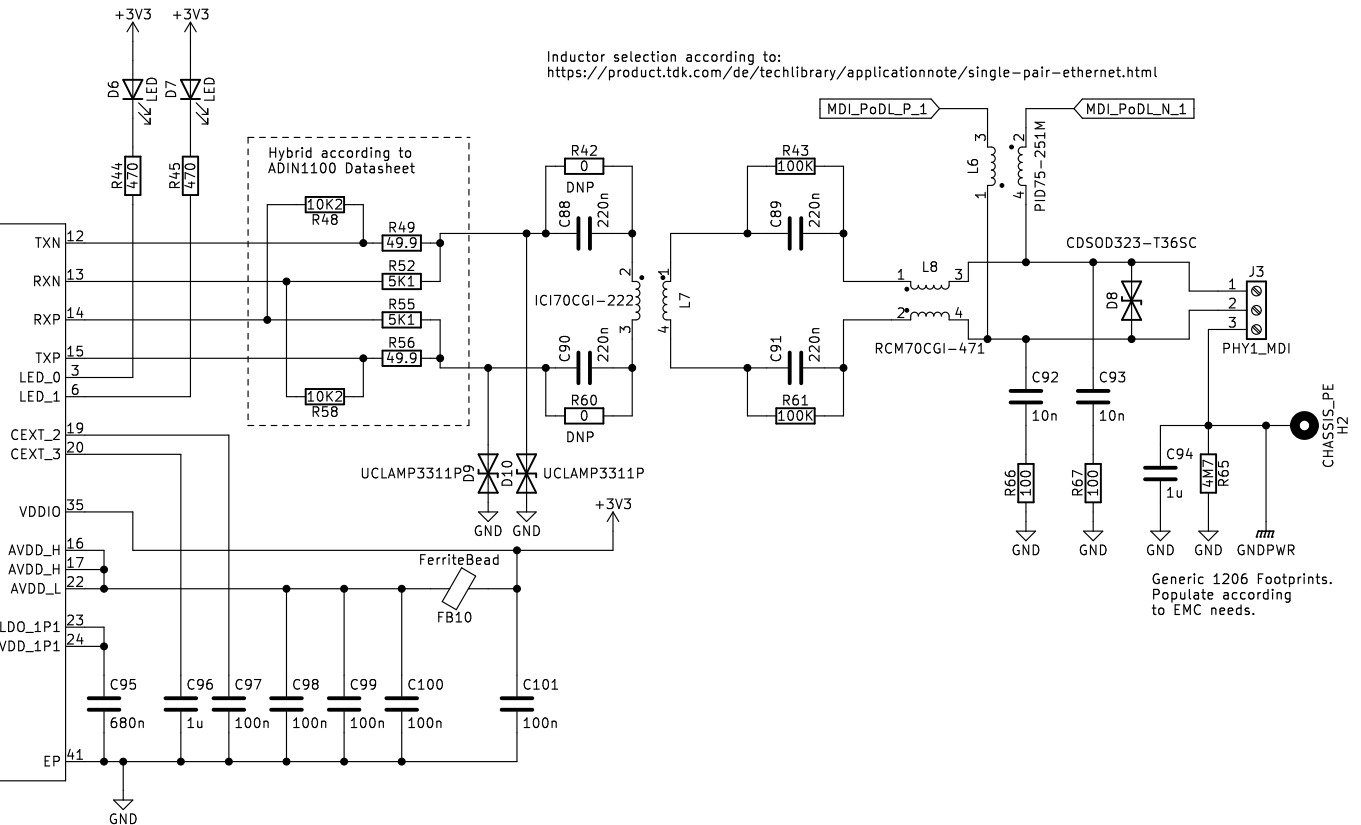
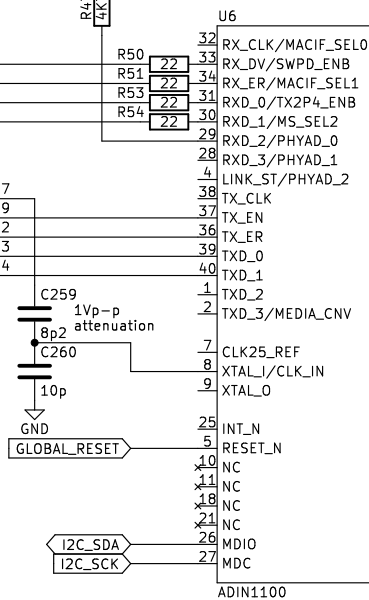
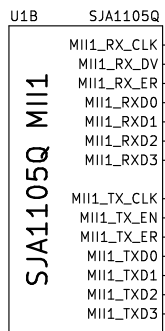
**Rev: REV A**

Id: 4/18

Config:  
 MACIF\_SEL: 0b00 ==> RMII  
 MS\_SEL2: 0b0 ==> Prefer Slave  
 TX2P4: 0b0 ==> Enable 1.0V and 2.4V TX  
 SWPD\_ENB: 0b1 ==> Do not enter power down

PHY ADDRESS: 0b001

Inductor selection according to:  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>



[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
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**Peter Heinrich**

Sheet: /10Base-T1L-PHY1/  
 File: 10Base-T1L-PHY1.kicad\_sch

**Title: Open Hardware 10Base-T1L Switch**

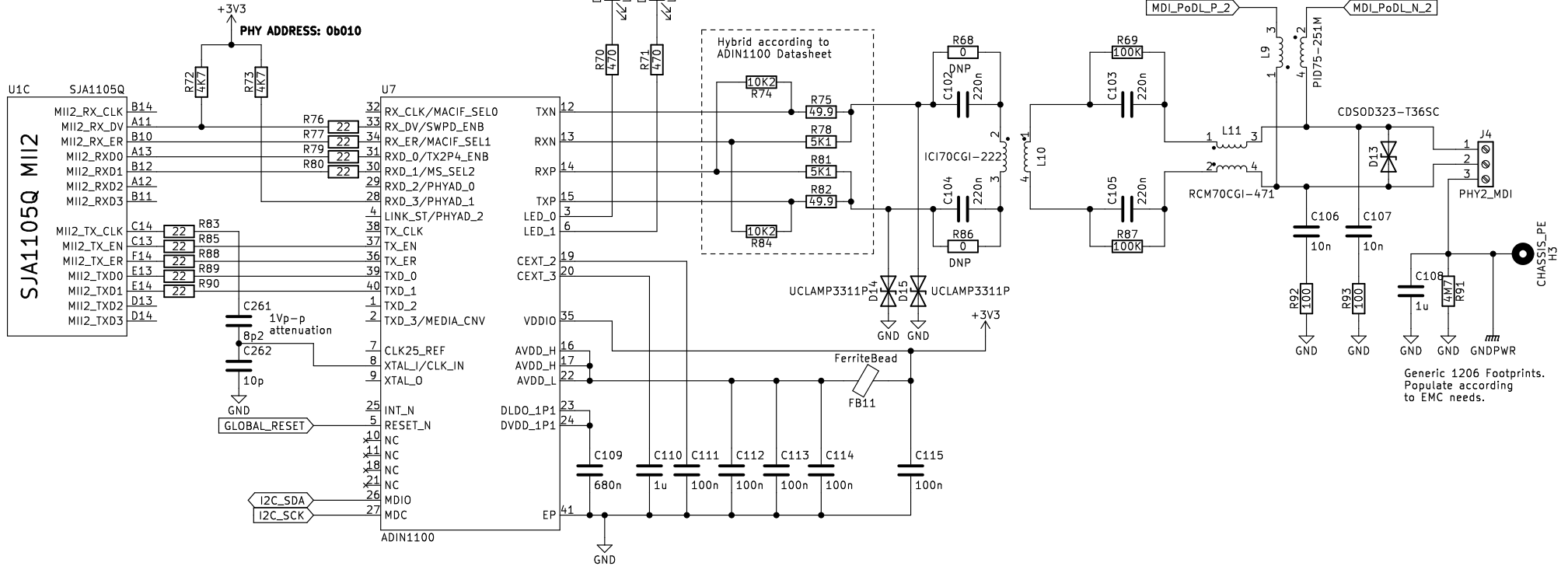
Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

**Rev: REV A**

Id: 5/18

Config:  
MACIF\_SEL: 0b00 => RMII  
MS\_SEL2: 0b0 => Prefer Slave  
TX2P4: 0b0 => Enable 1.0V and 2.4V TX  
SWPD\_ENB: 0b1 => Do not enter power down



Inductor selection according to:  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>

Generic 1206 Footprints.  
Populate according  
to EMC needs.

[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
Open Hardware License CERN-OHL-P v2

**Peter Heinrich**

Sheet: /10Base-T1L-PHY2/  
File: 10Base-T1L-PHY2.kicad\_sch

**Title: Open Hardware 10Base-T1L Switch**

Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

**Rev: REV A**

Id: 6/18

Config:  
 MACIF\_SEL: 0b00 ==> RMII  
 MS\_SEL2: 0b0 ==> Prefer Slave  
 TX2P4: 0b0 ==> Enable 1.0V and 2.4V TX  
 SWPD\_ENB: 0b1 ==> Do not enter power down

PHY ADDRESS: 0b011

U1D SJA1105Q MII3  
 MII3\_RX\_CLK J13  
 MII3\_RX\_DV G14  
 MII3\_RX\_ER F13  
 MII3\_RXD0 J14  
 MII3\_RXD1 H13  
 MII3\_RXD2 H14  
 MII3\_RXD3 G13  
 MII3\_TX\_CLK K14  
 MII3\_TX\_EN K13  
 MII3\_TX\_ER N14  
 MII3\_TXD0 M13  
 MII3\_TXD1 M14  
 MII3\_TXD2 L13  
 MII3\_TXD3 L14

C263 1Vp-p attenuation  
 8p2  
 C264 10p  
 GLOBAL\_RESET

I2C\_SDA  
 I2C\_SCK

U8 ADIN1100  
 RX\_CLK/MACIF\_SELO 32  
 RX\_DV/SWPD\_ENB 33  
 RX\_ER/MACIF\_SEL1 34  
 RXD\_0/TX2P4\_ENB 31  
 RXD\_1/MS\_SEL2 30  
 RXD\_2/PHYAD\_0 29  
 RXD\_3/PHYAD\_1 28  
 LINK\_ST/PHYAD\_2 4  
 TX\_CLK 38  
 TX\_EN 37  
 TX\_ER 36  
 TXD\_0 39  
 TXD\_1 40  
 TXD\_2 1  
 TXD\_3/MEDIA\_CNV 2  
 CLK25\_REF 7  
 XTAL1/CLK\_IN 8  
 XTAL\_O 9  
 INT\_N 25  
 RESET\_N 5  
 NC 10  
 NC 11  
 NC 18  
 NC 21  
 MDIO 26  
 MDC 27

TXN 12  
 RXN 13  
 RXP 14  
 TXP 15  
 LED\_0 3  
 LED\_1 6  
 CEXT\_2 19  
 CEXT\_3 20  
 VDDIO 35  
 AVDD\_H 16  
 AVDD\_H 17  
 AVDD\_L 22  
 DLDO\_1P1 23  
 DVDD\_1P1 24  
 EP 41  
 GND

Hybrid according to ADIN1100 Datasheet  
 R101 10K2  
 R102 49.9  
 R105 5K1  
 R108 5K1  
 R109 49.9  
 R111 10K2

UCLAMP3311P D19  
 D20  
 UCLAMP3311P  
 +3V3

FerriteBead  
 FB12

C123 680n  
 C124 1u  
 C125 100n  
 C126 100n  
 C127 100n  
 C128 100n  
 C129 100n

Inductor selection according to:  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>

MDL\_PoDL\_P\_3  
 MDL\_PoDL\_N\_3

L12  
 L13  
 L14  
 PID75-251M  
 RCM70CGI-471  
 CDS0D323-T365C  
 D18  
 PHY3\_MDI J5  
 CHASSIS\_PE H4

C120 10n  
 C121 10n  
 R419 100  
 R420 100  
 C122 1u  
 R118 4M7  
 GND  
 GND  
 GNDPWR

Generic 1206 Footprints.  
 Populate according to EMC needs.

[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
 Open Hardware License CERN-OHL-P v2

Peter Heinrich

Sheet: /10Base-T1L-PHY3/  
 File: 10Base-T1L-PHY3.kicad\_sch

Title: Open Hardware 10Base-T1L Switch

Size: A4  
 KiCad E.D.A. kicad (6.0.9-0)

Date: 2023-04-07

Rev: REV A  
 Id: 7/18

Config:  
MACIF\_SEL: 0b00 ==> RMII  
MS\_SEL2: 0b0 ==> Prefer Slave  
TX2P4: 0b0 ==> Enable 1.0V and 2.4V TX  
SWPD\_ENB: 0b1 ==> Do not enter power down

PHY ADDRESS: 0b100

U2B SJA1105Q MII1  
MII1\_RX\_CLK B6  
MII1\_RX\_DV A4  
MII1\_RX\_ER B3  
MII1\_RXD0 A6  
MII1\_RXD1 B5  
MII1\_RXD2 A5  
MII1\_RXD3 B4  
MII1\_TX\_CLK A7  
MII1\_TX\_EN B7  
MII1\_TX\_ER A10  
MII1\_TXD0 B9  
MII1\_TXD1 A9  
MII1\_TXD2 B8  
MII1\_TXD3 A8

C265 1Vp-p attenuation  
8p2  
C266 10p  
GND  
GLOBAL\_RESET

I2C\_SDA  
I2C\_SCK

U9 ADIN1100  
RX\_CLK/MACIF\_SELO 32  
RX\_DV/SWPD\_ENB 33  
RX\_ER/MACIF\_SEL1 34  
RXD\_0/TX2P4\_ENB 31  
RXD\_1/MS\_SEL2 30  
RXD\_2/PHYAD\_0 29  
RXD\_3/PHYAD\_1 28  
LINK\_ST/PHYAD\_2 4  
TX\_CLK 38  
TX\_EN 37  
TX\_ER 36  
TXD\_0 39  
TXD\_1 40  
TXD\_2 1  
TXD\_3/MEDIA\_CNV 2  
CLK25\_REF 7  
XTAL1/CLK\_IN 8  
XTAL\_O 9  
INT\_N 25  
RESET\_N 5  
NC 10  
NC 11  
NC 18  
NC 21  
MDIO 26  
MDC 27

AVDD\_H 16  
AVDD\_H 17  
AVDD\_L 22  
DLDO\_1P1 23  
DVDD\_1P1 24  
EP 41

+3V3  
D21 LED  
R123 470  
+3V3  
D22 LED  
R124 470

Hybrid according to  
ADIN1100 Datasheet  
R127 10K2  
R128 49.9  
R131 5K1  
R134 5K1  
R135 49.9  
R137 10K2

UCLAMP3311P  
D24  
D25  
UCLAMP3311P  
+3V3

FerriteBead  
FB13

C137 680n  
C138 1u  
C139 100n  
C140 100n  
C141 100n  
C142 100n  
C143 100n

Inductor selection according to:  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>

MDI\_PoDL\_P\_4  
MDI\_PoDL\_N\_4

L15  
L16  
L17  
C131 220n  
C133 220n  
R122 100K  
R140 100K  
R145 100  
R146 100  
C134 10n  
C135 10n  
C136 1u  
R147 4M7  
R144  
CDS0D323-T365C  
D23  
PHY4\_MDI J6  
CHASSIS\_PE H5

Generic 1206 Footprints.  
Populate according  
to EMC needs.

[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
Open Hardware License CERN-OHL-P v2

Peter Heinrich

Sheet: /10Base-T1L-PHY4/  
File: 10Base-T1L-PHY4.kicad\_sch

Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

Rev: REV A

Id: 8/18



Config:  
MACIF\_SEL: 0b00 ==> RMII  
MS\_SEL2: 0b0 ==> Prefer Slave  
TX2P4: 0b0 ==> Enable 1.0V and 2.4V TX  
SWPD\_ENB: 0b1 ==> Do not enter power down

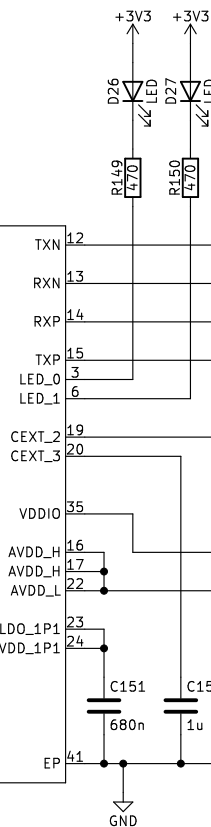
PHY ADDRESS: 0b101

U2C SJA1105Q MII2  
MII2\_RX\_CLK B14  
MII2\_RX\_DV A11  
MII2\_RX\_ER B10  
MII2\_RXD0 A13  
MII2\_RXD1 B12  
MII2\_RXD2 A12  
MII2\_RXD3 B11  
MII2\_TX\_CLK C14  
MII2\_TX\_EN C13  
MII2\_TX\_ER F14  
MII2\_TXD0 F13  
MII2\_TXD1 E14  
MII2\_TXD2 D13  
MII2\_TXD3 D14

C267 1Vp-p attenuation  
8p2  
C268 10p  
GND  
GLOBAL\_RESET

I2C\_SDA  
I2C\_SCK

U10  
RX\_CLK/MACIF\_SELO 32  
RX\_DV/SWPD\_ENB 33  
RX\_ER/MACIF\_SEL1 34  
RXD\_0/TX2P4\_ENB 31  
RXD\_1/MS\_SEL2 30  
RXD\_2/PHYAD\_0 29  
RXD\_3/PHYAD\_1 28  
LINK\_ST/PHYAD\_2 4  
TX\_CLK 38  
TX\_EN 37  
TX\_ER 36  
TXD\_0 39  
TXD\_1 40  
TXD\_2 1  
TXD\_3/MEDIA\_CNV 2  
CLK25\_REF 7  
XTAL1/CLK\_IN 8  
XTAL\_O 9  
INT\_N 25  
RESET\_N 5  
NC 10  
NC 11  
NC 18  
NC 21  
MDIO 26  
MDC 27  
ADIN1100



Config:  
 MACIF\_SEL: 0b00 ==> RMII  
 MS\_SEL2: 0b0 ==> Prefer Slave  
 TX2P4: 0b0 ==> Enable 1.0V and 2.4V TX  
 SWPD\_ENB: 0b1 ==> Do not enter power down

PHY ADDRESS: 0b110

Inductor selection according to:  
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>

Hybrid according to  
 ADIN1100 Datasheet

Generic 1206 Footprints.  
 Populate according  
 to EMC needs.

[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
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**Peter Heinrich**

Sheet: /10Base-T1L-PHY6/  
 File: 10Base-T1L-PHY6.kicad\_sch

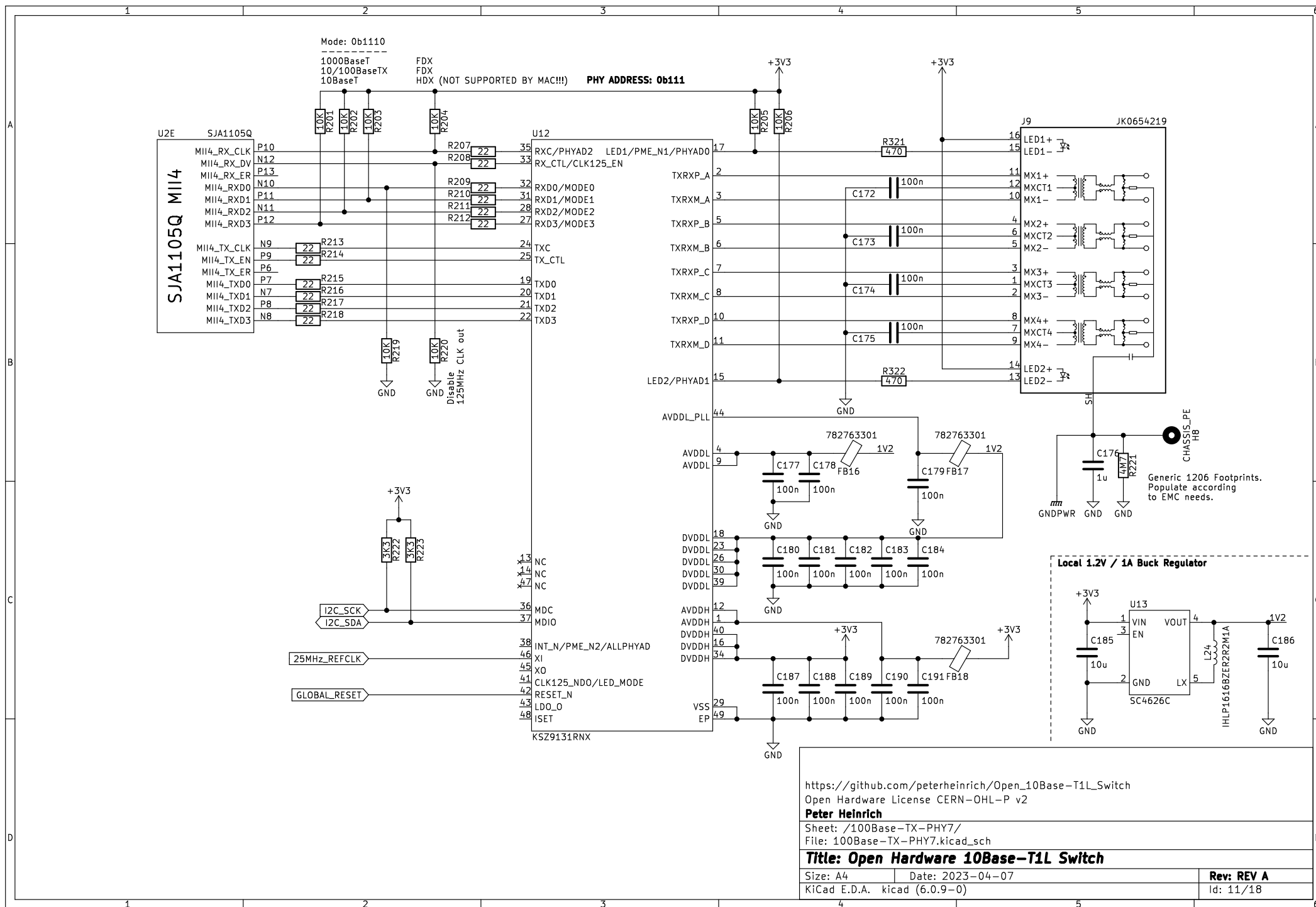
**Title: Open Hardware 10Base-T1L Switch**

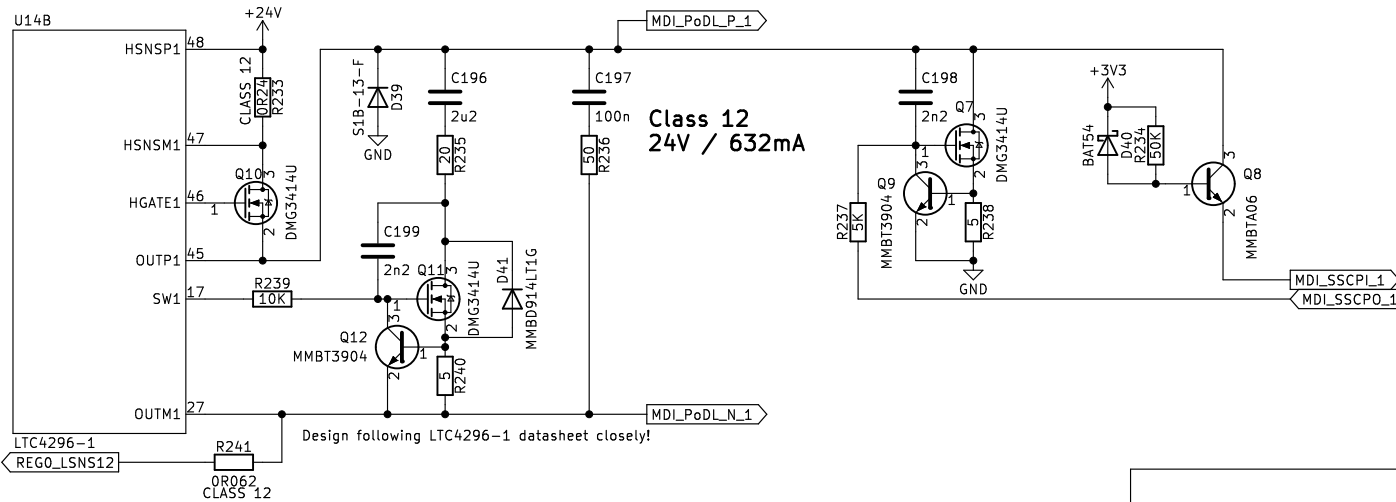
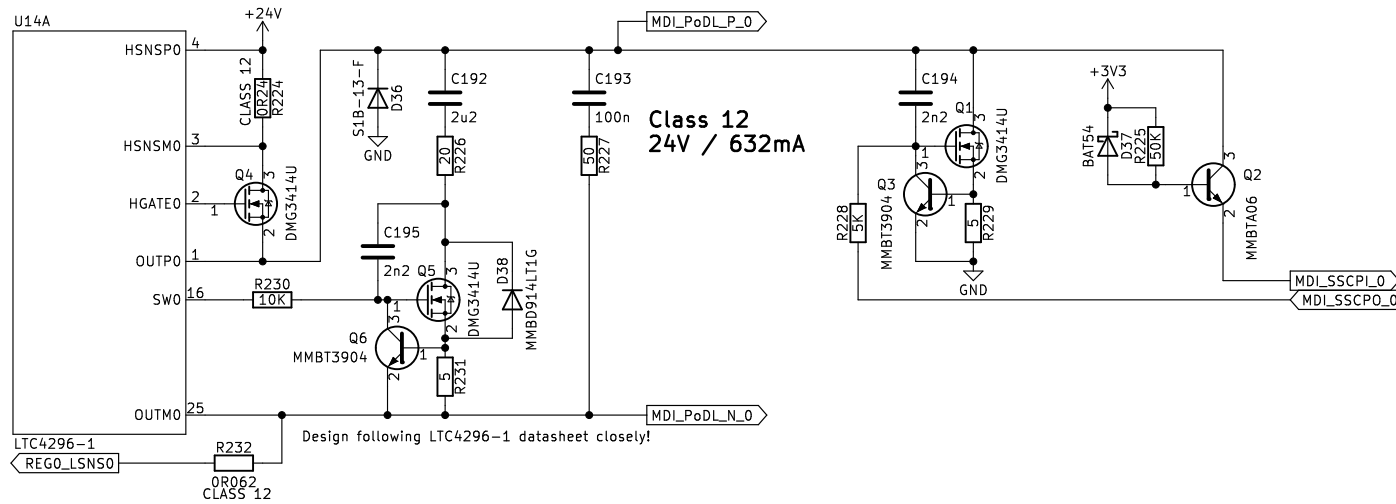
Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

**Rev: REV A**

Id: 10/18





[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
Open Hardware License CERN-OHL-P v2

**Peter Heinrich**

Sheet: /PoDL PHY 0-1/  
File: PoDL\_PHY0-1.kicad\_sch

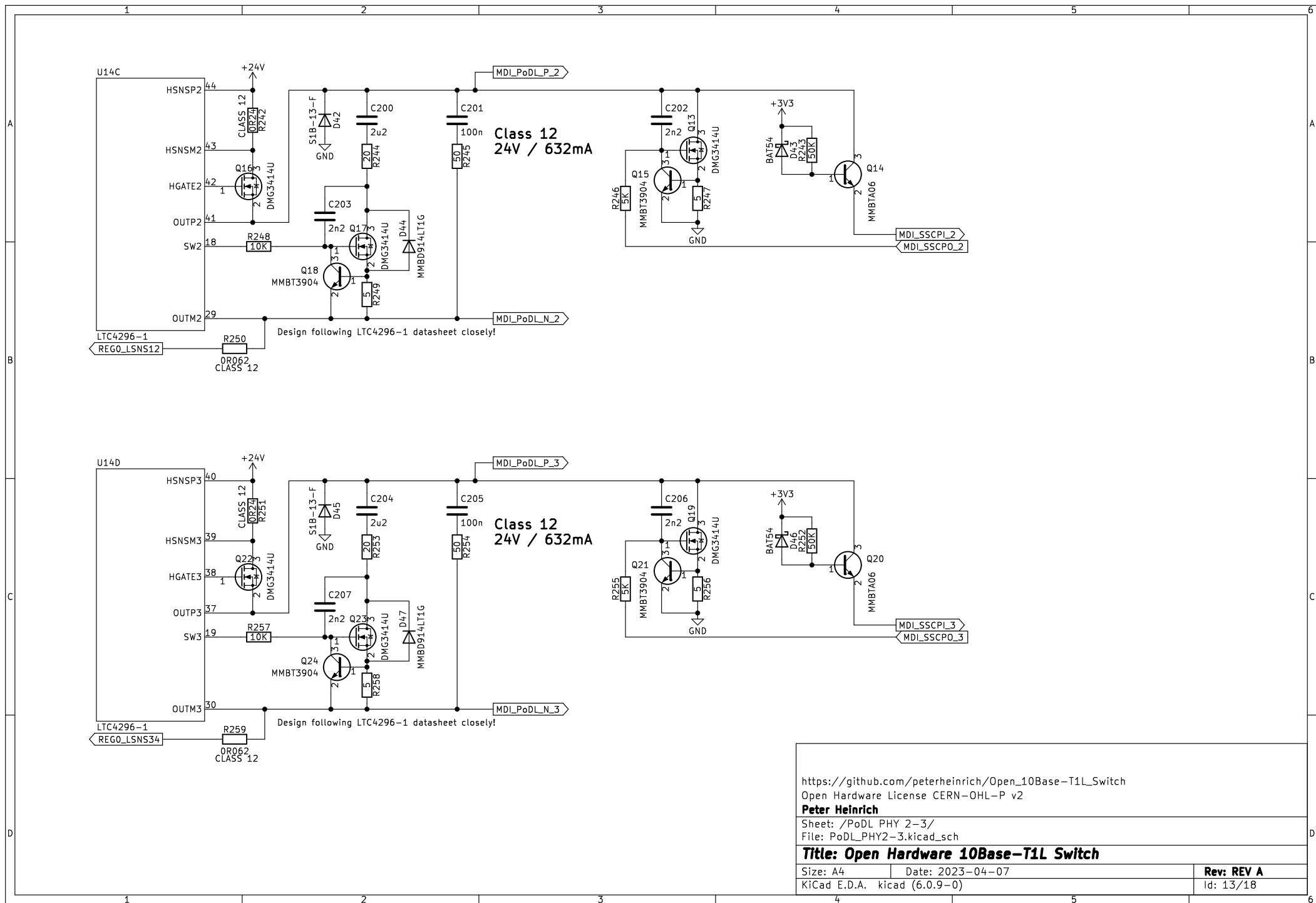
**Title: Open Hardware 10Base-T1L Switch**

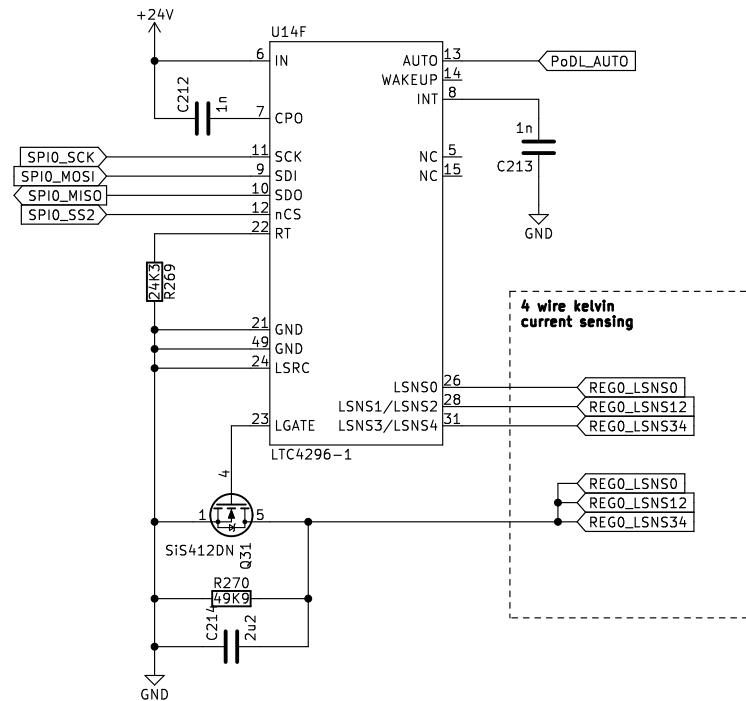
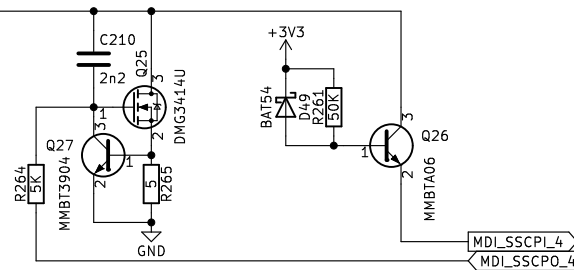
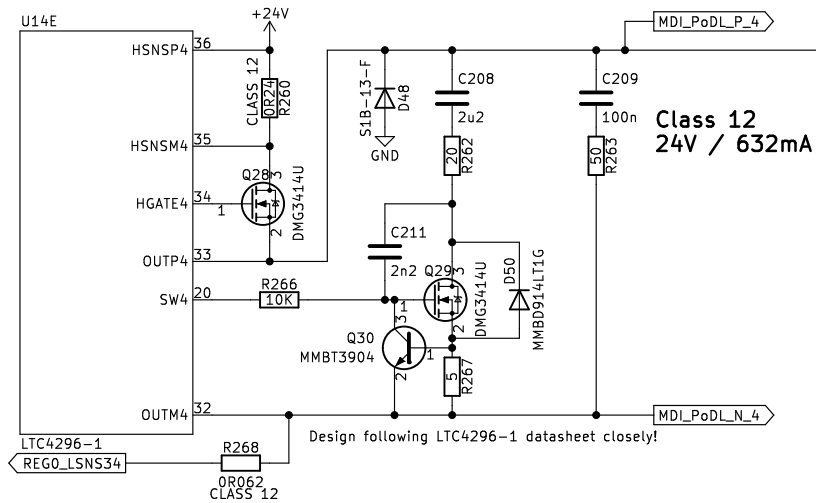
Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

**Rev: REV A**

Id: 12/18





[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
Open Hardware License CERN-OHL-P v2

**Peter Heinrich**

Sheet: /PoDL PHY4 REG0/  
File: PoDL\_PHY4\_REG0.kicad\_sch

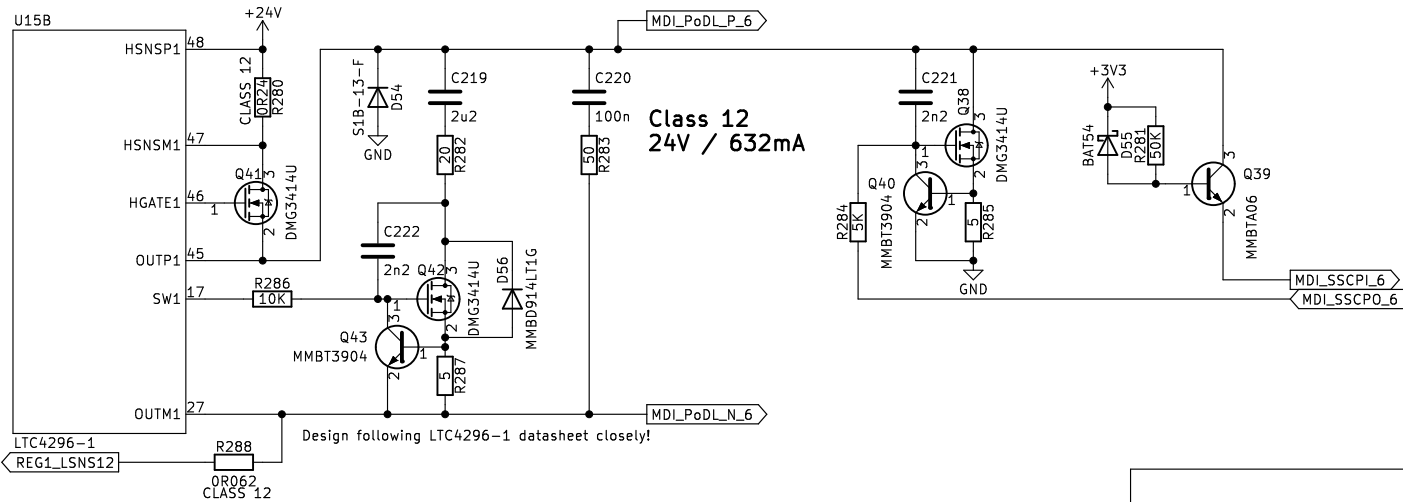
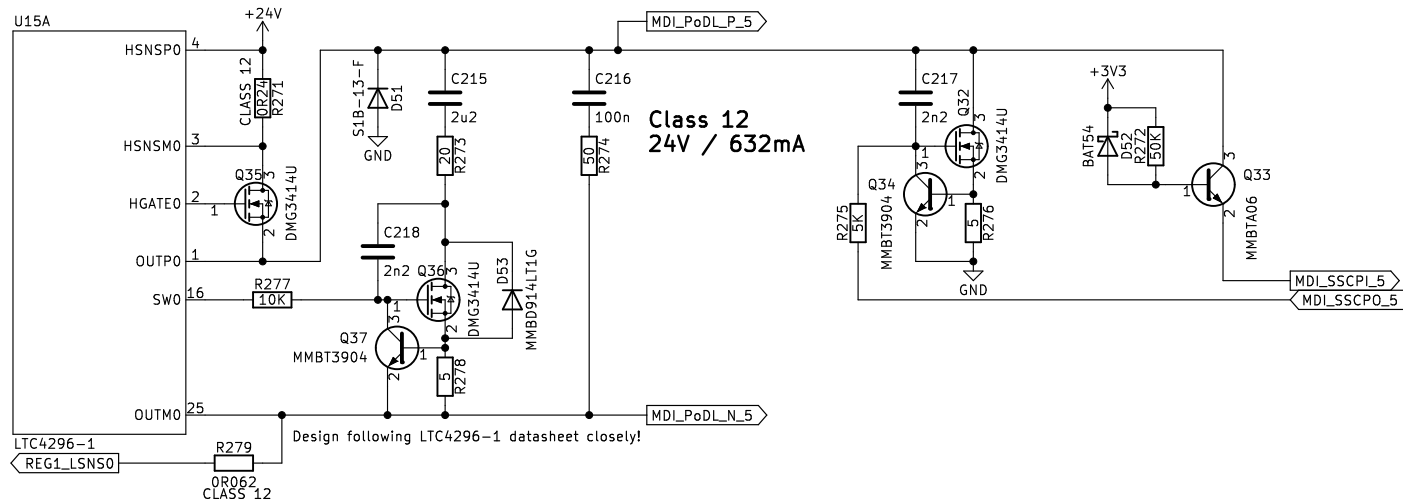
**Title: Open Hardware 10Base-T1L Switch**

Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

Rev: REV A

Id: 14/18



[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)

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**Peter Heinrich**

Sheet: /PoDL PHY 5-6/

File: PoDL\_PHY5-6.kicad\_sch

**Title: Open Hardware 10Base-T1L Switch**

Size: A4 Date: 2023-04-07

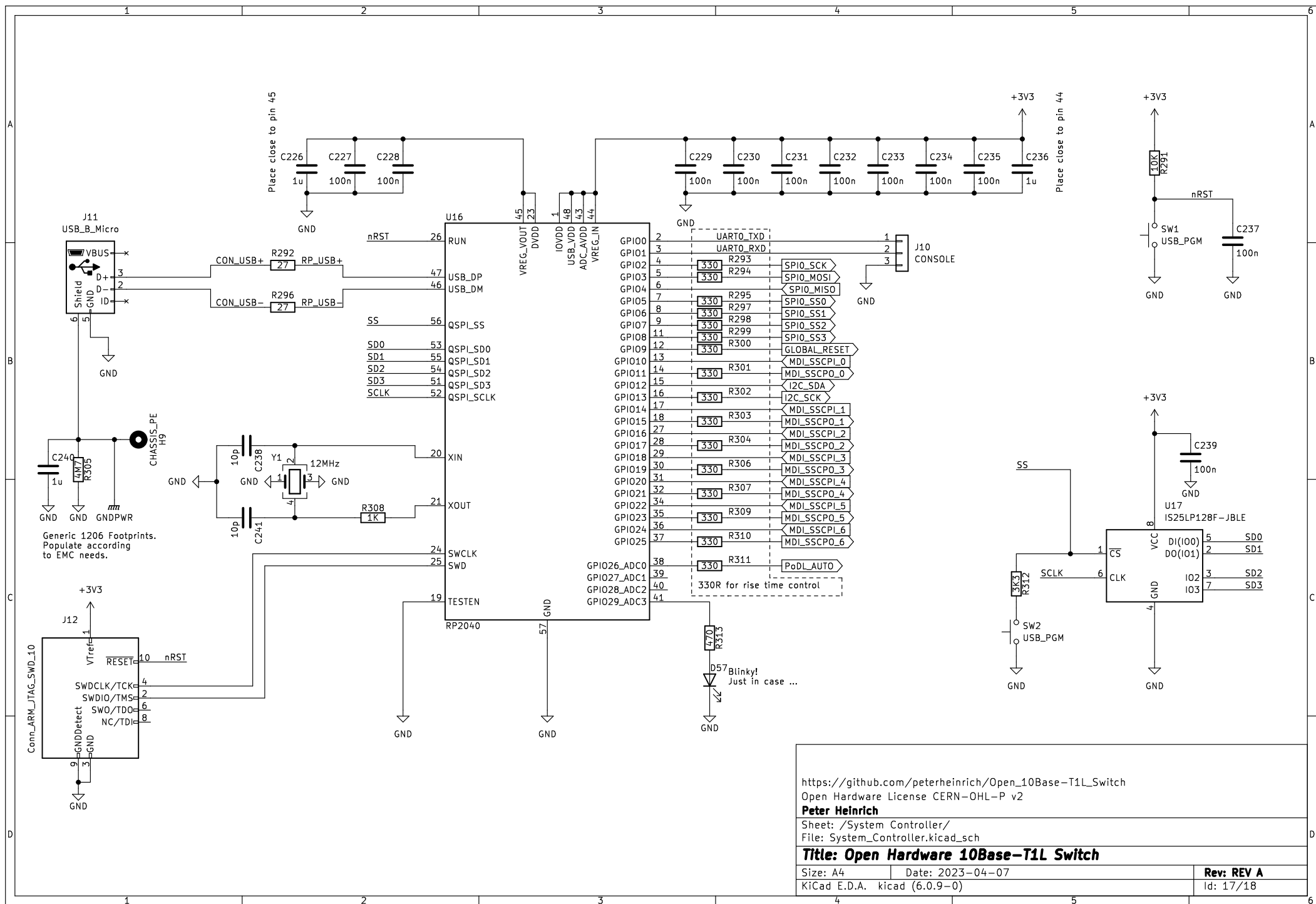
KiCad E.D.A. kicad (6.0.9-0)

**Rev: REV A**

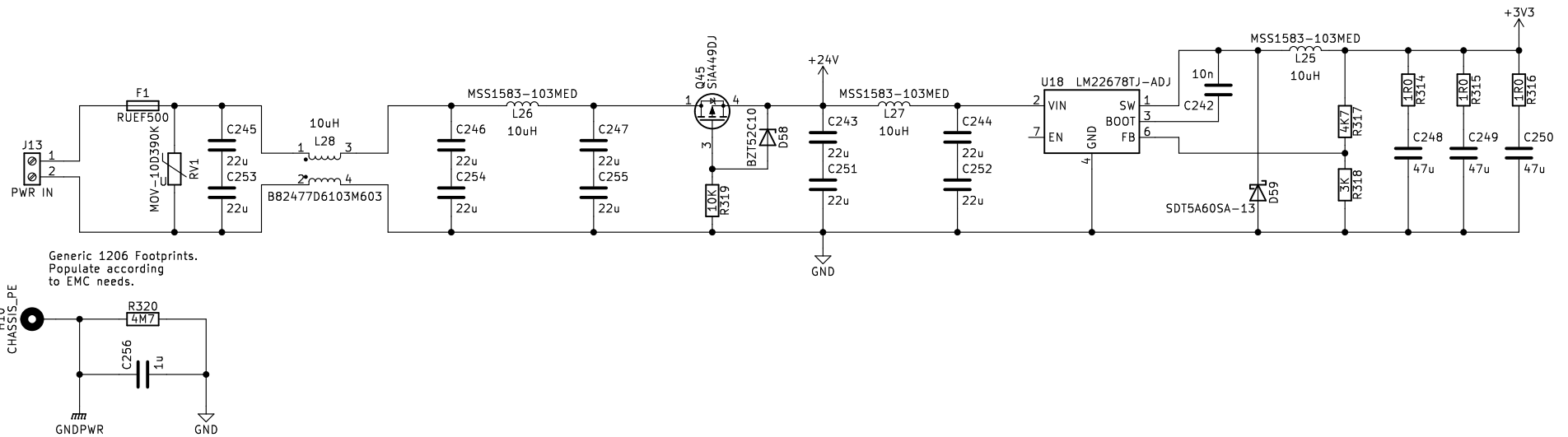
Id: 15/18







# 24V / 5A DC REGULATED



[https://github.com/peterheinrich/Open\\_10Base-T1L\\_Switch](https://github.com/peterheinrich/Open_10Base-T1L_Switch)  
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**Peter Heinrich**

Sheet: /Power Supply/  
File: Power\_Supply.kicad\_sch

**Title: Open Hardware 10Base-T1L Switch**

Size: A4 Date: 2023-04-07

KiCad E.D.A. kicad (6.0.9-0)

Rev: REV A

Id: 18/18