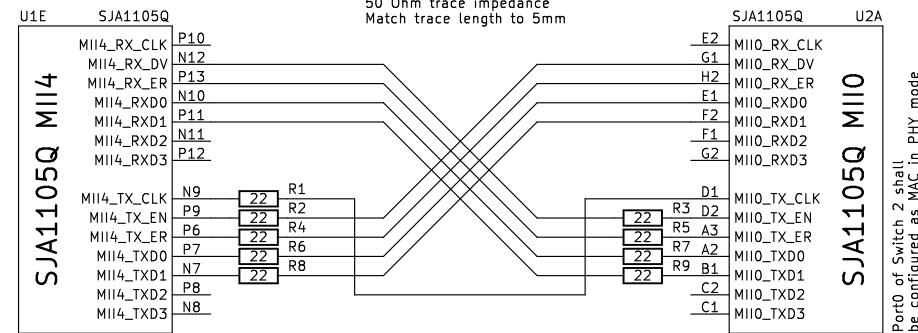
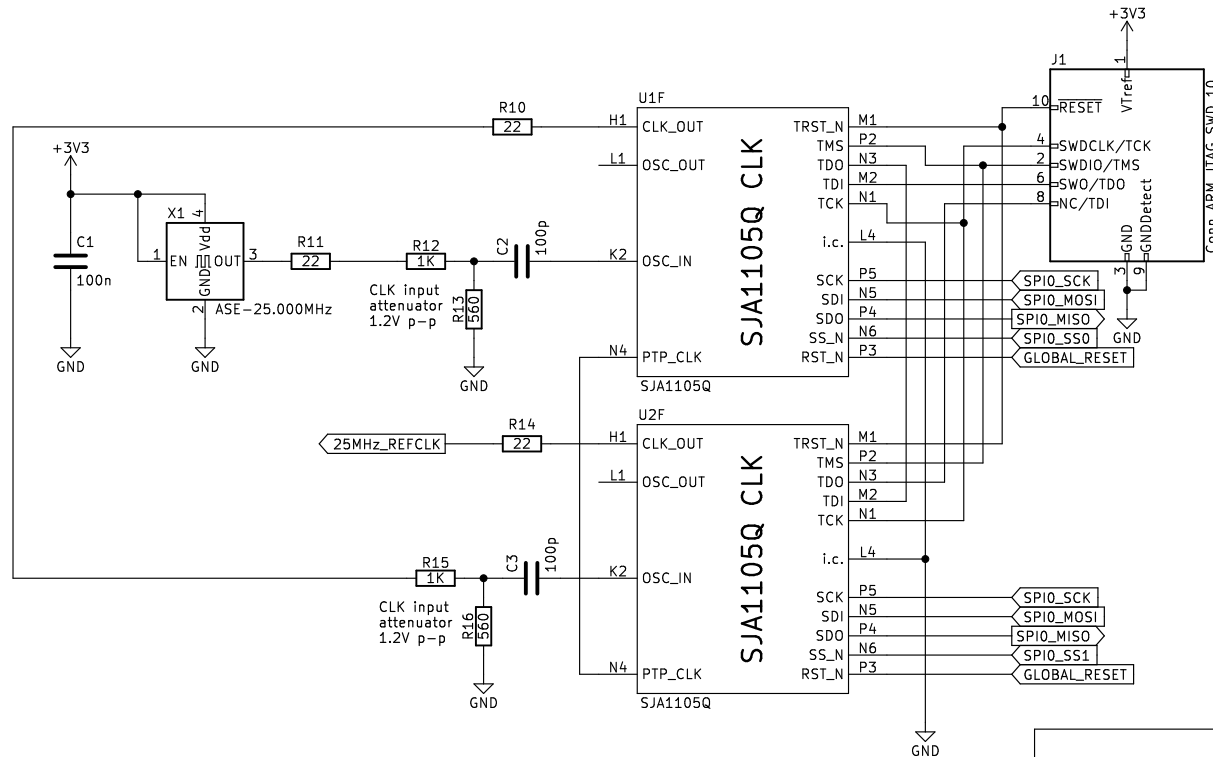


Inter Switch Connection RMII<-->RMII 100MBit



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
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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)

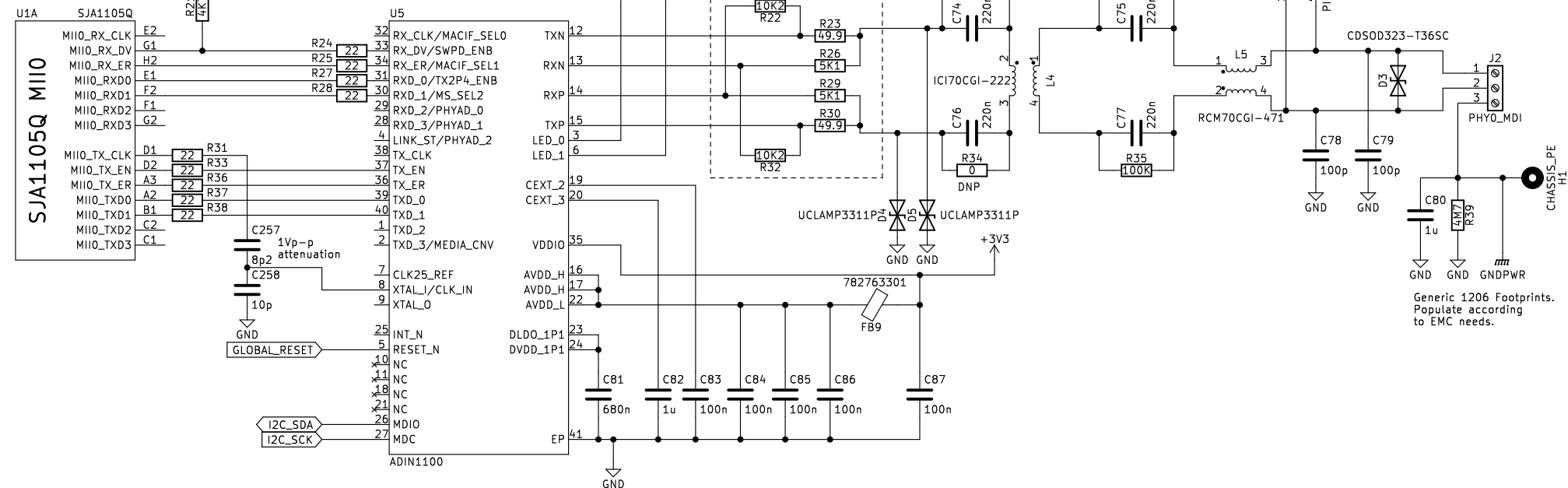
Rev: REV A

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>



Generic 1206 Footprints.
Populate according
to EMC needs.

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_tutorial_1115.pdf

https://github.com/peterheinrich/Open_10Base-T1L_Switch
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Peter Heinrich

Sheet: /10Base-T1L-PHY0/
File: 10Base-T1L-PHY0.kicad_sch

Title: Open Hardware 10Base-T1L Switch

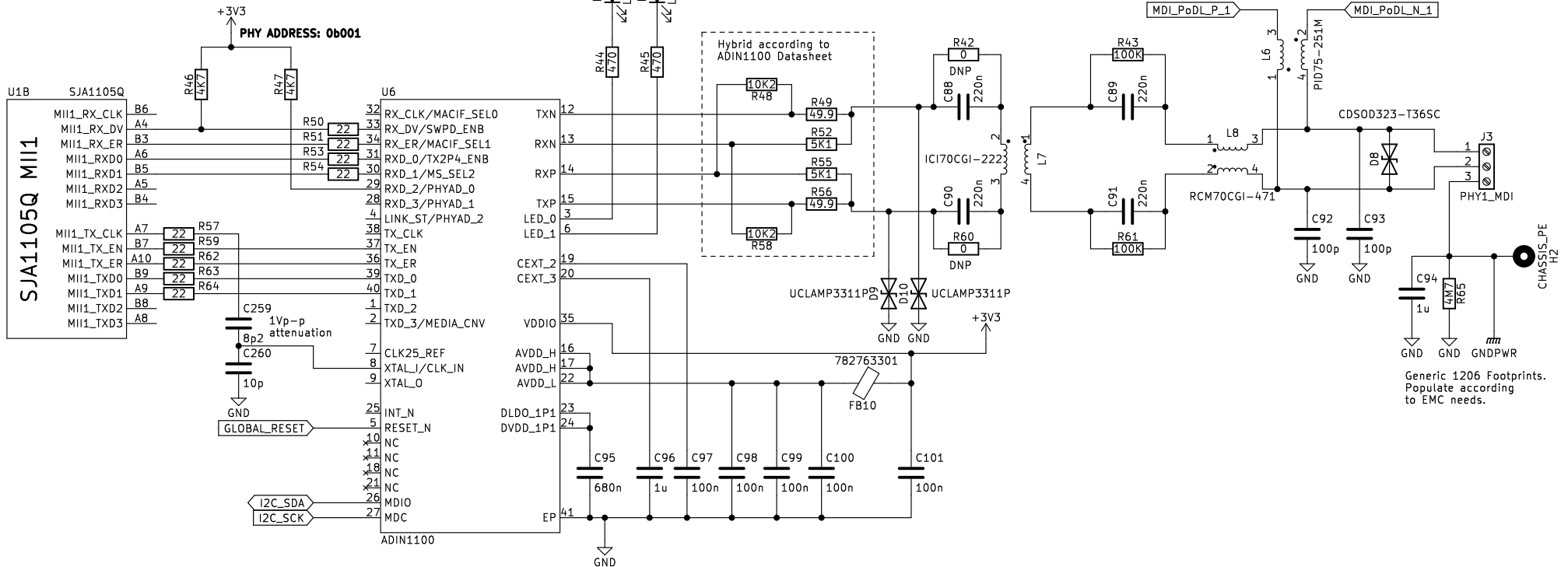
Size: A4 Date: 2023-04-07

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



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

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

AVDD_H 16
AVDD_H 17
AVDD_L 22
DLDO_1P1 23
DVDD_1P1 24
EP 41

+3V3
D16 LED
R96 470
+3V3
D17 LED
R97 470

Hybrid according to
ADIN1100 Datasheet
R101 10K2
R102 49.9
R105 5K1
R108 5K1
R109 49.9
R111 10K2
IC170CGI-2223
C116 220n
C118 220n
R113 0 DNP
UCLAMP3311P
D19
D20
UCLAMP3311P

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
CD50D323-T365C
D18
RCM70CGI-471
C120 100p
C121 100p
PHY3_MDI J5
CHASSIS_PE H4

Generic 1206 Footprints.
Populate according
to EMC needs.

https://github.com/peterheinrich/Open_10Base-T1L_Switch
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Peter Heinrich

Sheet: /10Base-T1L-PHY3/
File: 10Base-T1L-PHY3.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: 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

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

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

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

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

UCLAMP3311P D24
UCLAMP3311P D25
UCLAMP3311P D26
GND
GND
+3V3

IC170CGI-2223
R121 0
C130 DNP
C132 220n
R139 0
DNP

MDI_PoDL_P_4
MDI_PoDL_N_4
L15
L16
C131 100K
C133 220n
R140 100K
L17
RCM70CGI-471
C134 100p
C135 100p
GND
GND
PHY4_MDI J6
CHASSIS_PE H5

Generic 1206 Footprints.
Populate according
to EMC needs.

https://github.com/peterheinrich/Open_10Base-T1L_Switch
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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

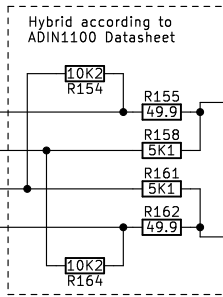
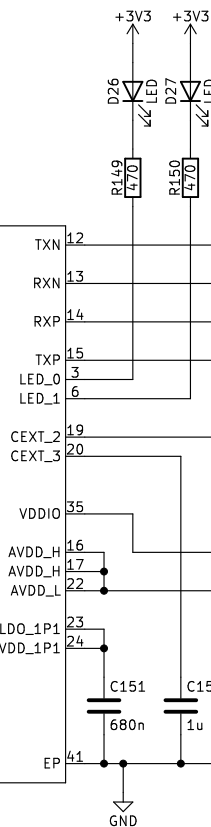
MII2_RX_CLK B14
 MII2_RX_DV A11
 MII2_RX_ER B10
 MII2_RXD0 A13
 MII2_RXD1 B12
 MII2_RXD2 A12
 MII2_RXD3 B11
 MII2_TX_CLK C14
 MII2_TX_EN C13
 MII2_TX_ER F14
 MII2_TXD0 E13
 MII2_TXD1 E14
 MII2_TXD2 D13
 MII2_TXD3 D14

C267 1Vp-p attenuation
 8p2
 C268 10p
 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



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

https://github.com/peterheinrich/Open_10Base-T1L_Switch
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Sheet: /10Base-T1L-PHY5/
 File: 10Base-T1L-PHY5.kicad_sch

Title: Open Hardware 10Base-T1L Switch

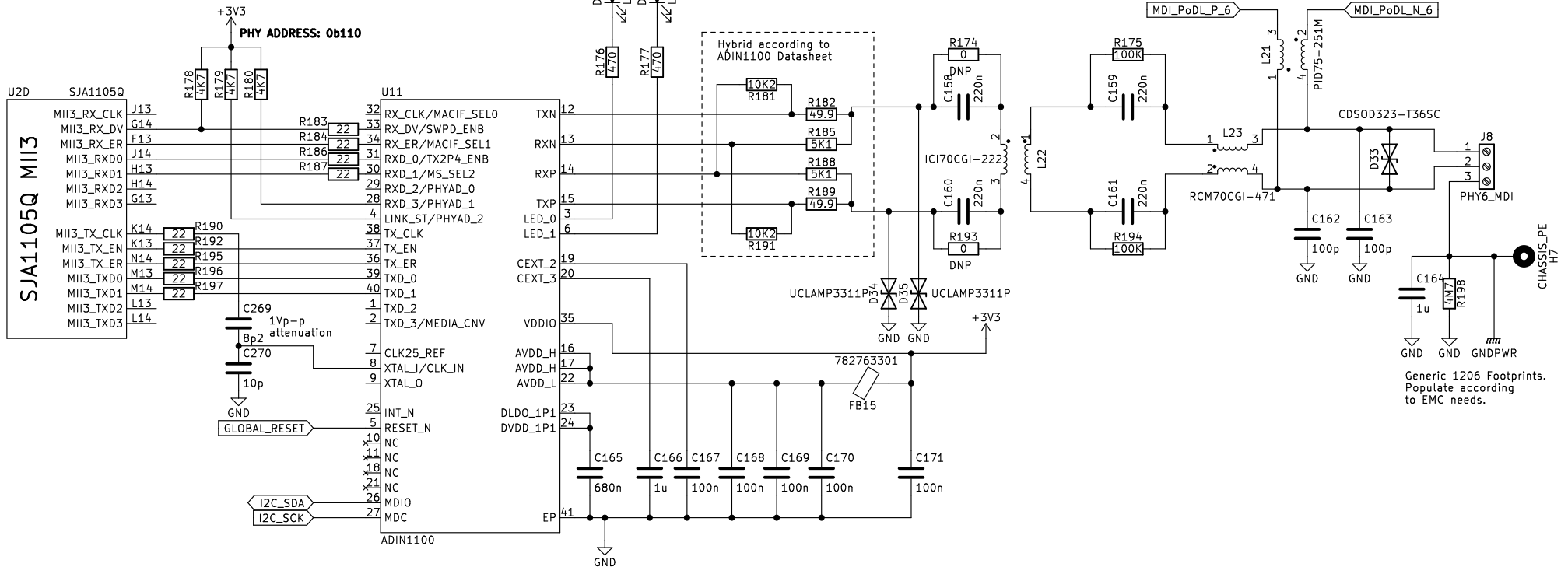
Size: A4 Date: 2023-04-07

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

Rev: REV A

Id: 9/18

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



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Sheet: /10Base-T1L-PHY6/
File: 10Base-T1L-PHY6.kicad_sch

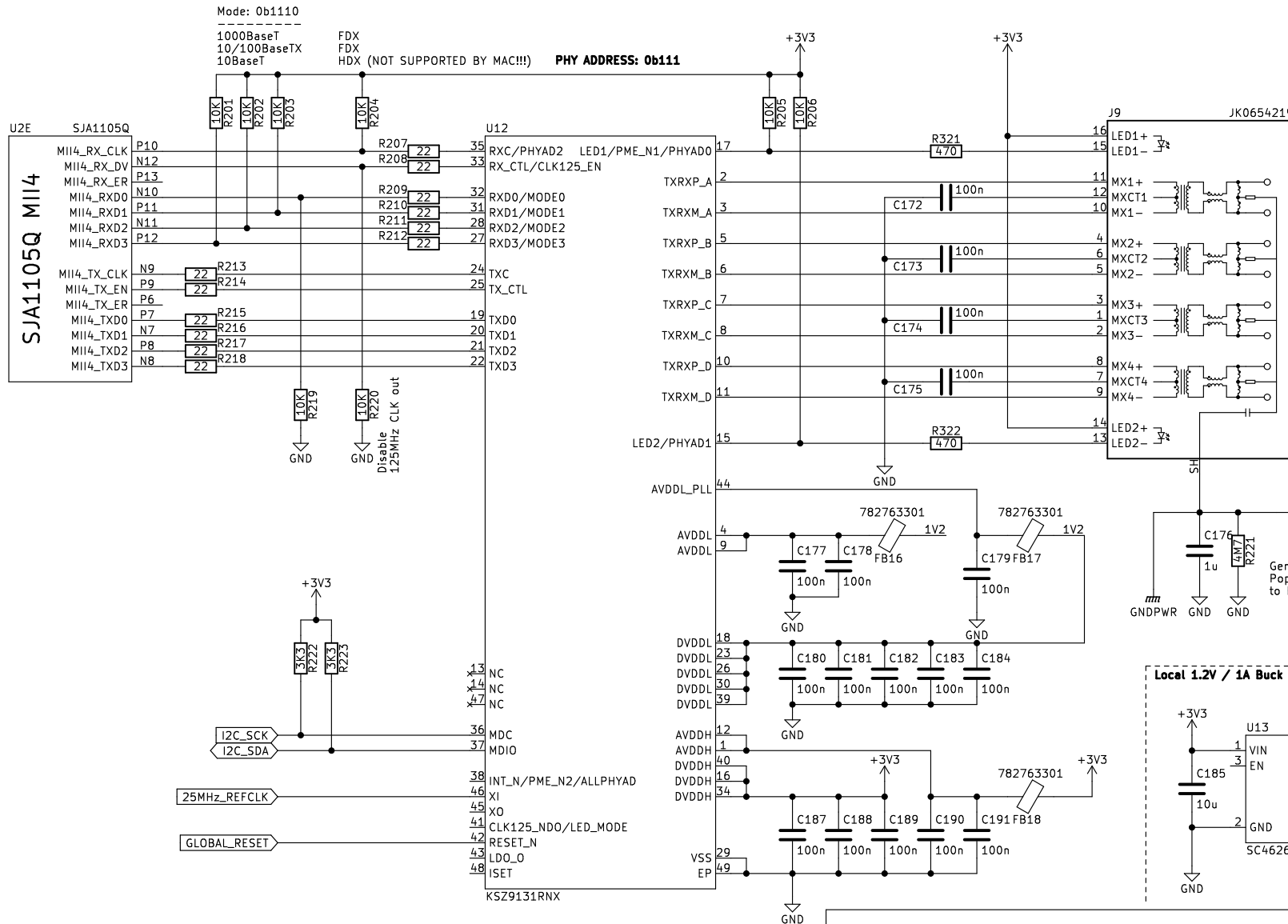
Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

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

Rev: REV A

Id: 10/18



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Peter Heinrich

Sheet: /100Base-TX-PHY7/

File: 100Base-TX-PHY7.kicad_sch

Title: Open Hardware 10Base-T1L Switch

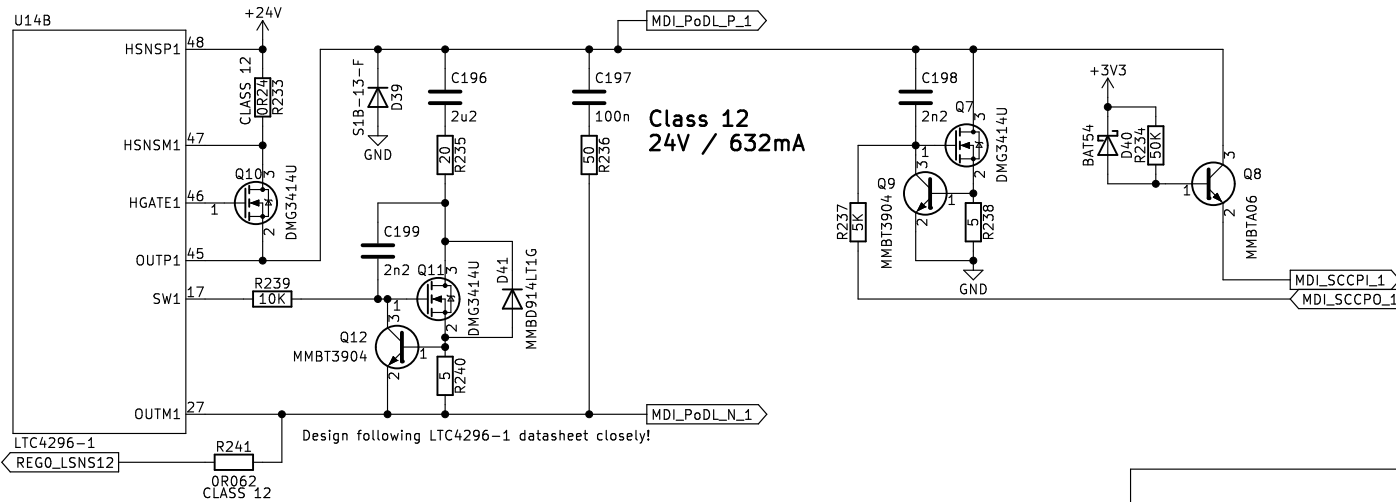
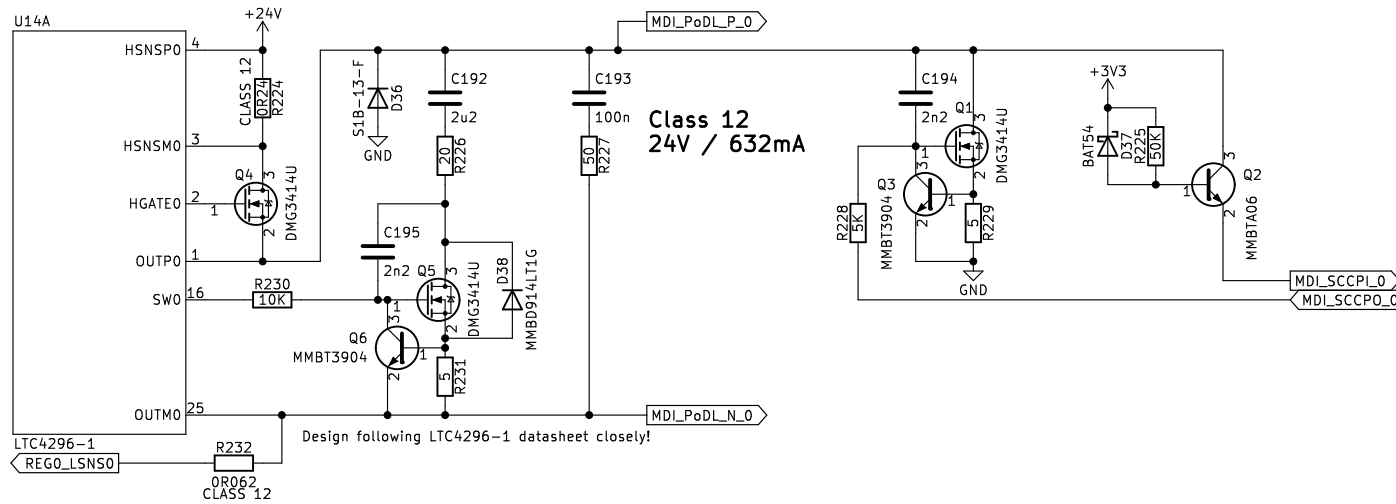
Size: A4

Date: 2023-04-07

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

Rev: REV A

Id: 11/18



https://github.com/peterheinrich/Open_10Base-T1L_Switch
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Sheet: /PoDL PHY 0-1/
File: PoDL_PHY0-1.kicad_sch

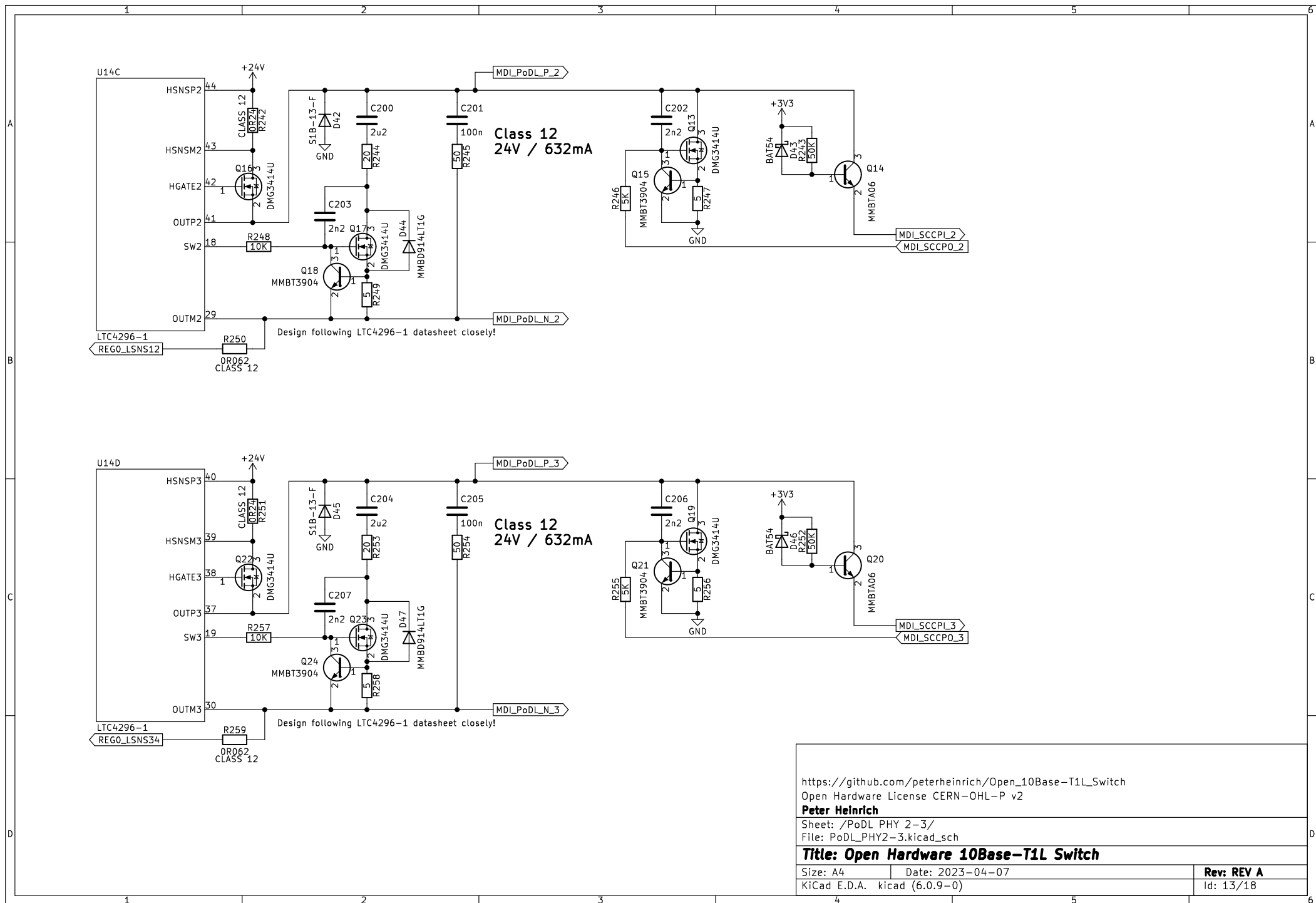
Title: Open Hardware 10Base-T1L Switch

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
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Peter Heinrich

Sheet: /PoDL PHY 2-3/

File: PoDL_PHY2-3.kicad_sch

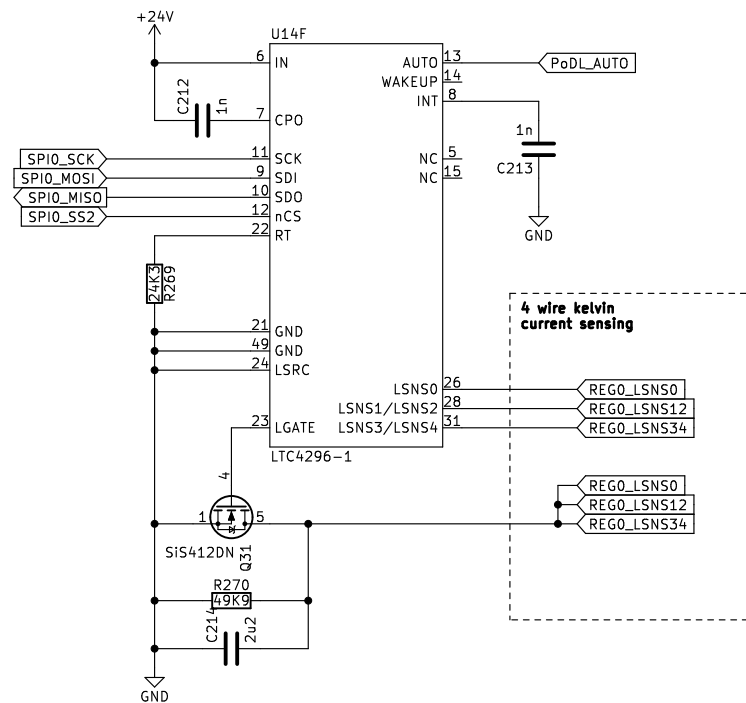
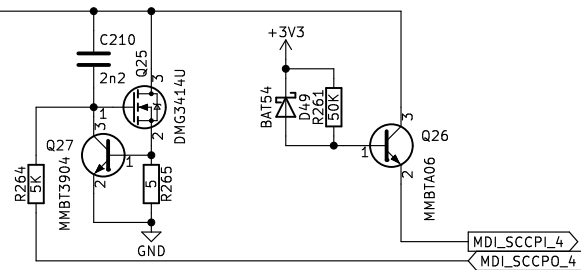
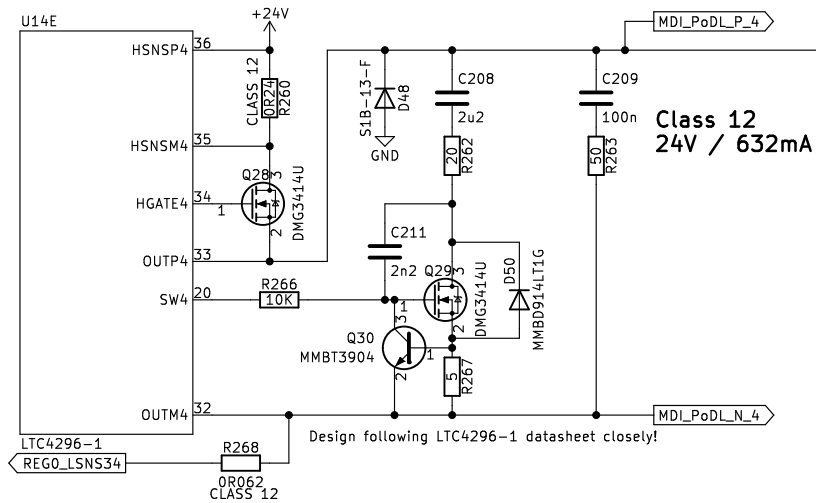
Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

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

Rev: REV A

Id: 13/18



https://github.com/peterheinrich/Open_10Base-T1L_Switch
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Peter Heinrich

Sheet: /PoDL PHY4 REG0/
File: PoDL_PHY4_REG0.kicad_sch

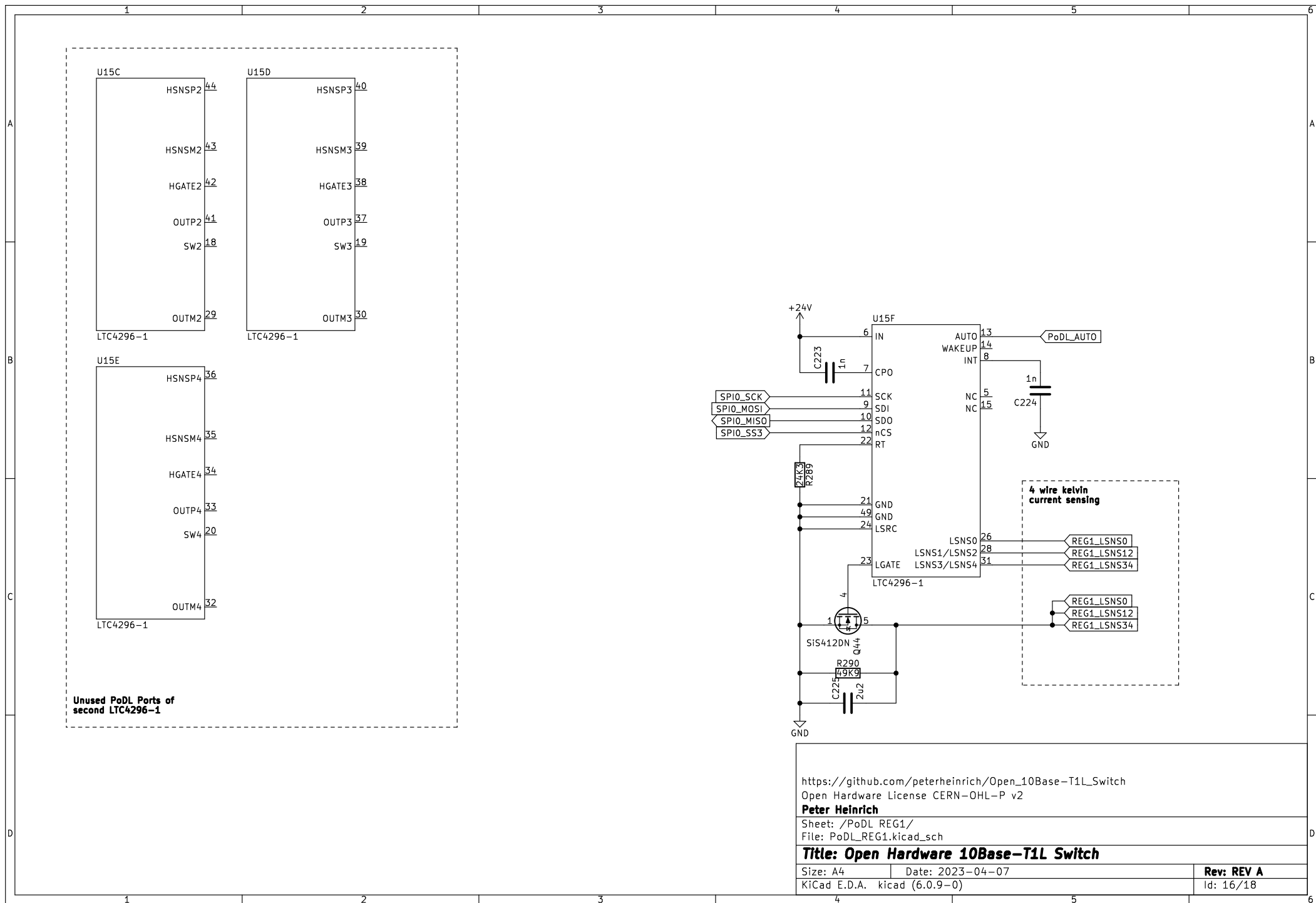
Title: Open Hardware 10Base-T1L Switch

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
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Peter Heinrich

Sheet: /PoDL REG1/
File: PoDL_REG1.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: 16/18

