

RP2040
System Controller

System Controller

File: System_Controller.kicad_sch

SJA1105Q Switch

File: SJA1105Q_Switch.kicad_sch

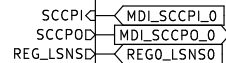
SJA1105Q Power

File: SJA1105Q_Power.kicad_sch

Power Supply

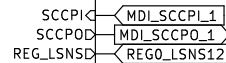
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10Base-T1L-PHY0



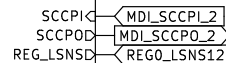
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10Base-T1L-PHY1



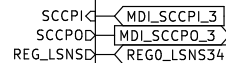
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10Base-T1L-PHY2



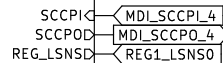
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10Base-T1L-PHY3



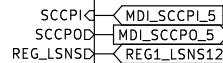
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10Base-T1L-PHY4



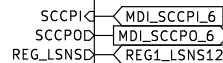
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10Base-T1L-PHY5



File: 10Base-T1L-PHY.kicad_sch

10Base-T1L-PHY6



File: 10Base-T1L-PHY.kicad_sch

7 PHYs 10Base-T1L
ADIN1100 PHY
PoDL circuitry

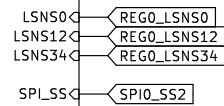
100Base-TX-PHY7



File: 100Base-TX-PHY7.kicad_sch

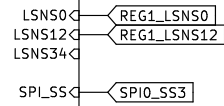
1 PHY 100Base-TX
Uplink
KSZ9131RNX

PoDL_REG0



File: PoDL_REG.kicad_sch

PoDL_REG1



File: PoDL_REG.kicad_sch

UnusedUnits



File: UnusedUnits.kicad_sch

7 Port PoDL CLASS 12
2x LTC4296-1 Controller

24V supply

8-Port 10MBit SPE Field Switch

7-Port 10Base-T1L/PoDL CLASS 12
10/100/1000MBit Uplink (RJ45)STATUS: DESIGN ONLY!
!!! UNTESTED !!!

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Sheet: /

File: Open_10Base-T1L_Switch.kicad_sch

Title: Open Hardware 10Base-T1L Switch

Size: A4

Date: 2023-04-07

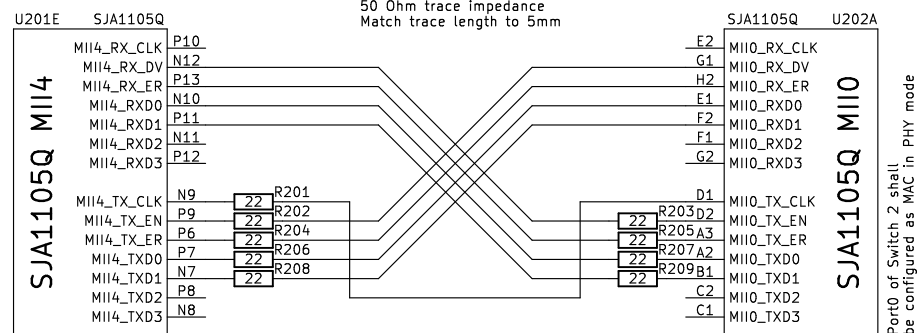
KiCad E.D.A. kicad (6.0.9-0)

Rev: REV A

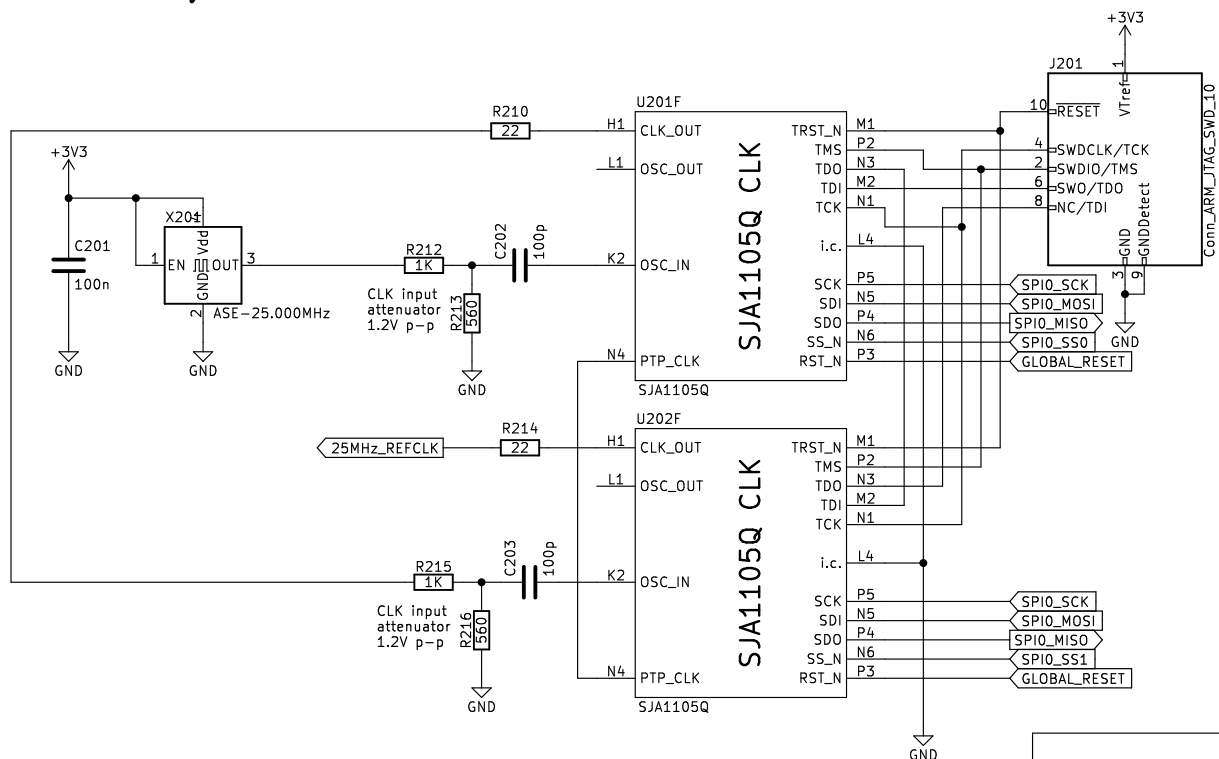
Id: 1/16



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.

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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)

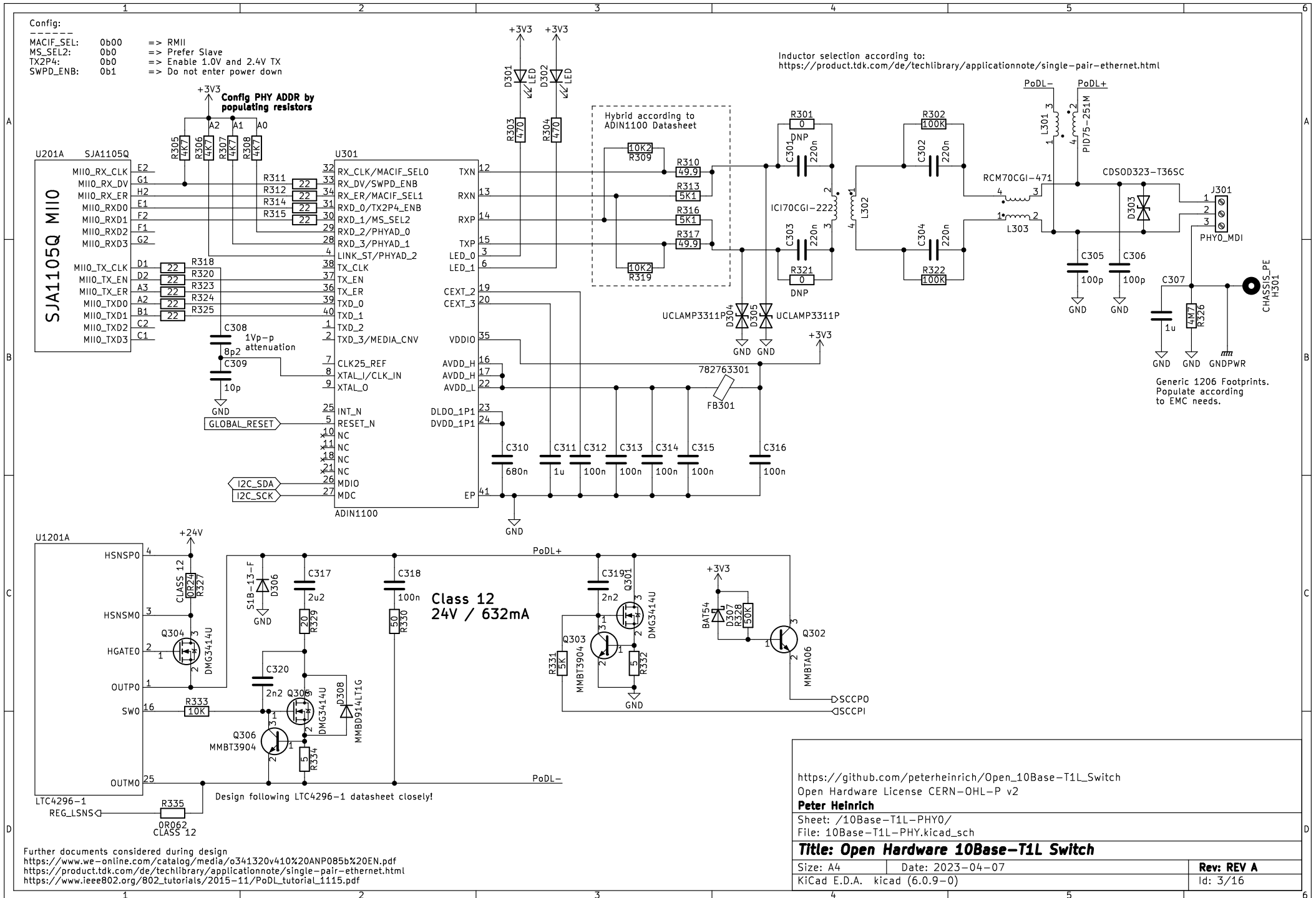
Rev: REV A

Id: 2/16

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

Config PHY ADDR by
 populating resistors

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_tutorial1.1115.pdf

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Sheet: /10Base-T1L-PHY0/

File: 10Base-T1L-PHY.kicad_sch

Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

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

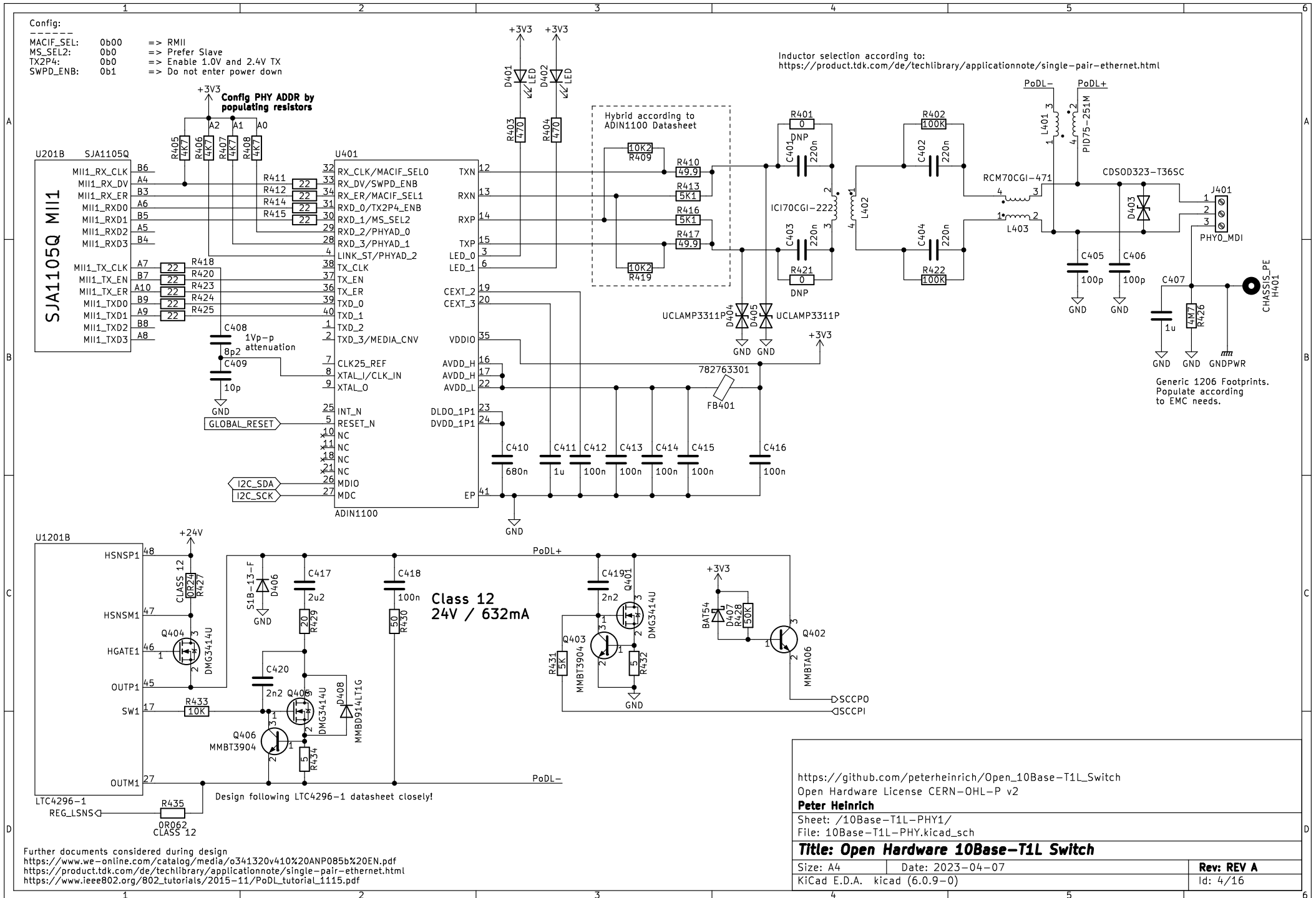
Rev: REV A

Id: 3/16

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

Config PHY ADDR by
 populating resistors

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/o341320v41020ANP085b%20EN.pdf>
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>
https://www.ieee802.org/802_tutorials/2015-11/PoDL_tutorial1.1115.pdf

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Sheet: /10Base-T1L-PHY1/
 File: 10Base-T1L-PHY.kicad_sch

Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

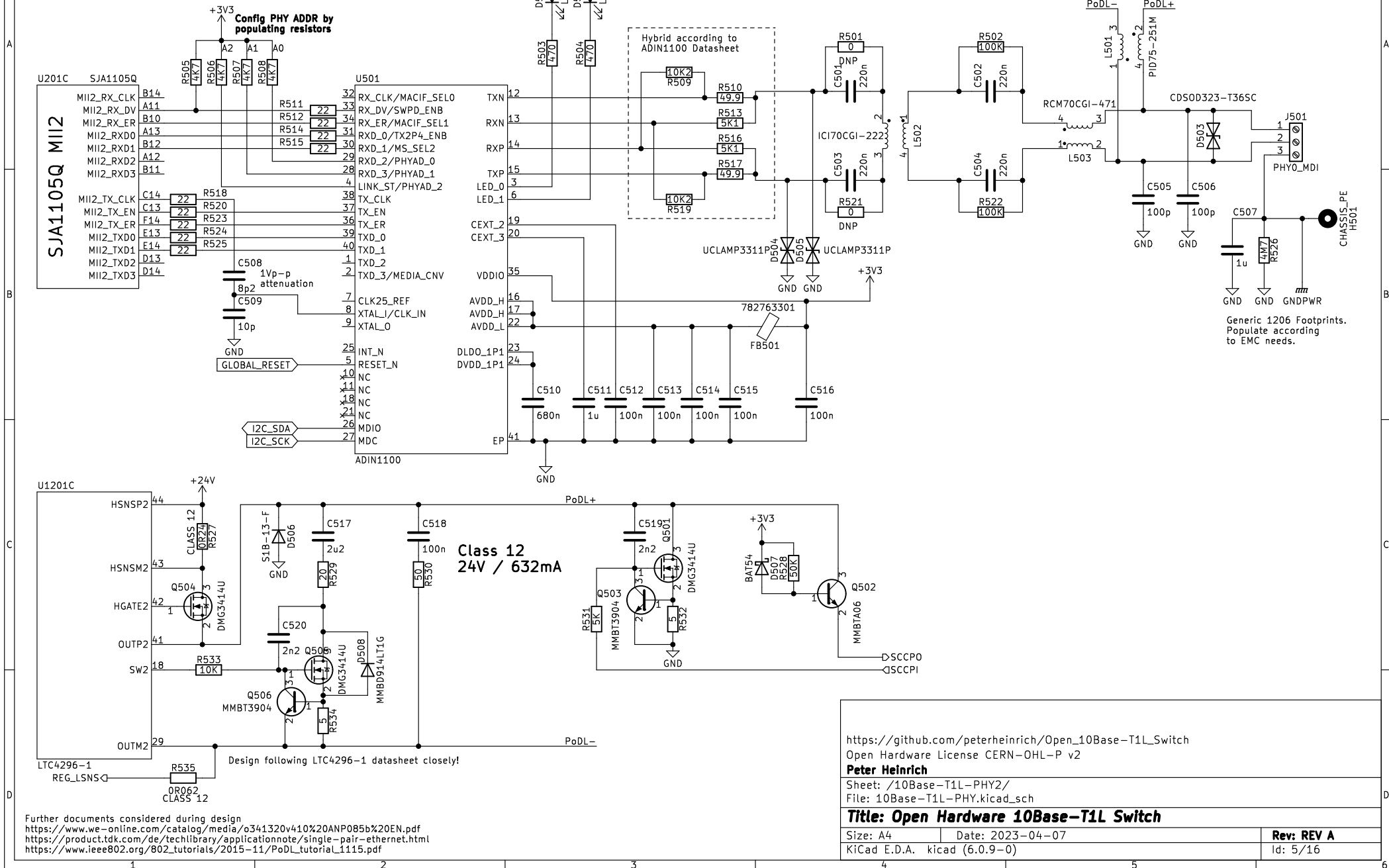
KiCad E.D.A. kicad (6.0.9-0)

Rev: REV A

Id: 4/16

```
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
```

+3V3



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

Generic 1206 Footprints.
Populate according
to EMC needs.

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Sheet: /10Base-T1L-PHY2/
File: 10Base-T1L-PHY.kicad_sch

Title: Open Hardware 10Base-T1L Switch

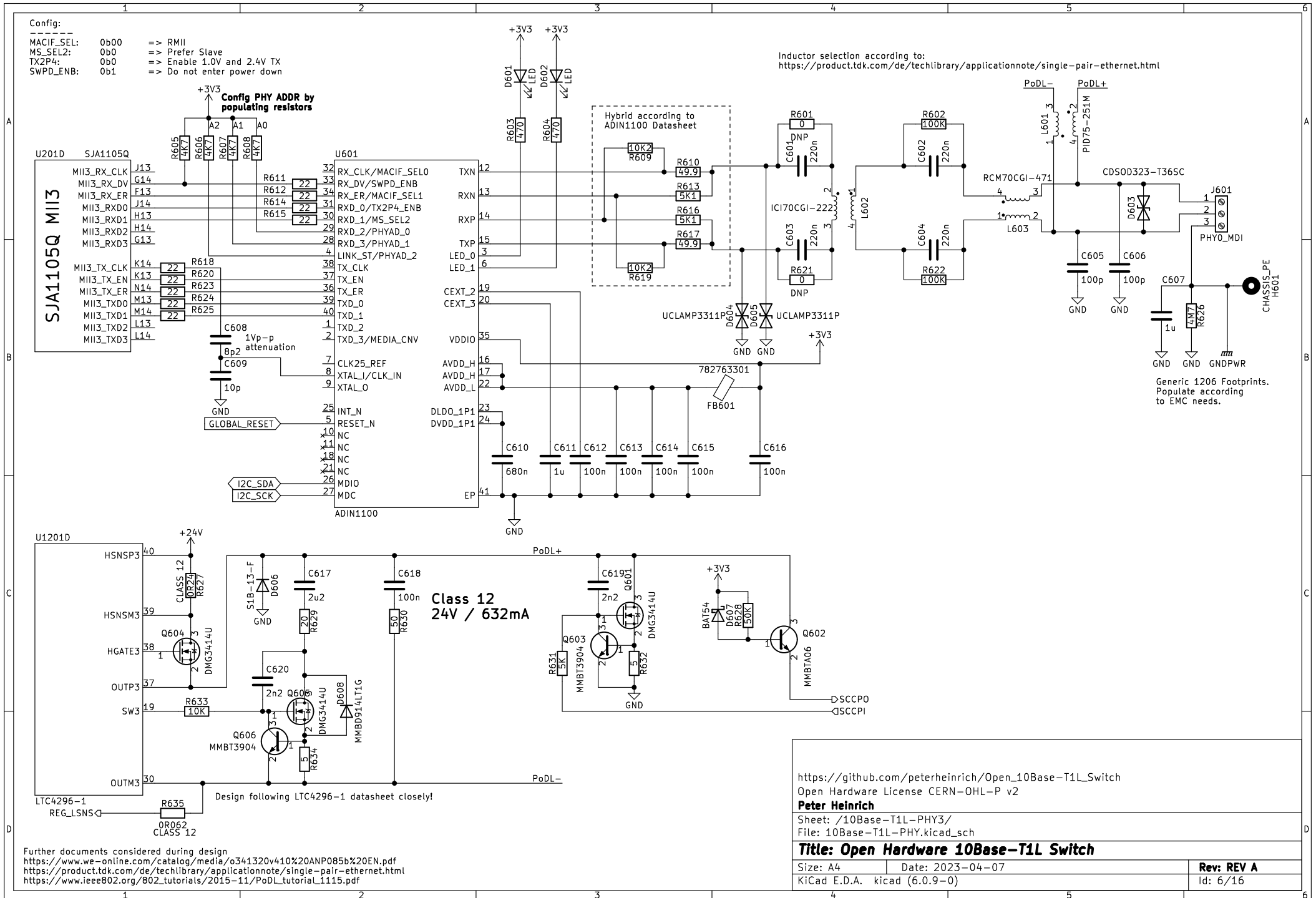
Size: A4	Date: 2023-04-07
KiCad E.D.A. kicad (6.0.9-0)	

Rev: REV A
Id: 5/16

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

Config PHY ADDR by
 populating resistors

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_tutorial1.1115.pdf

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

Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

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

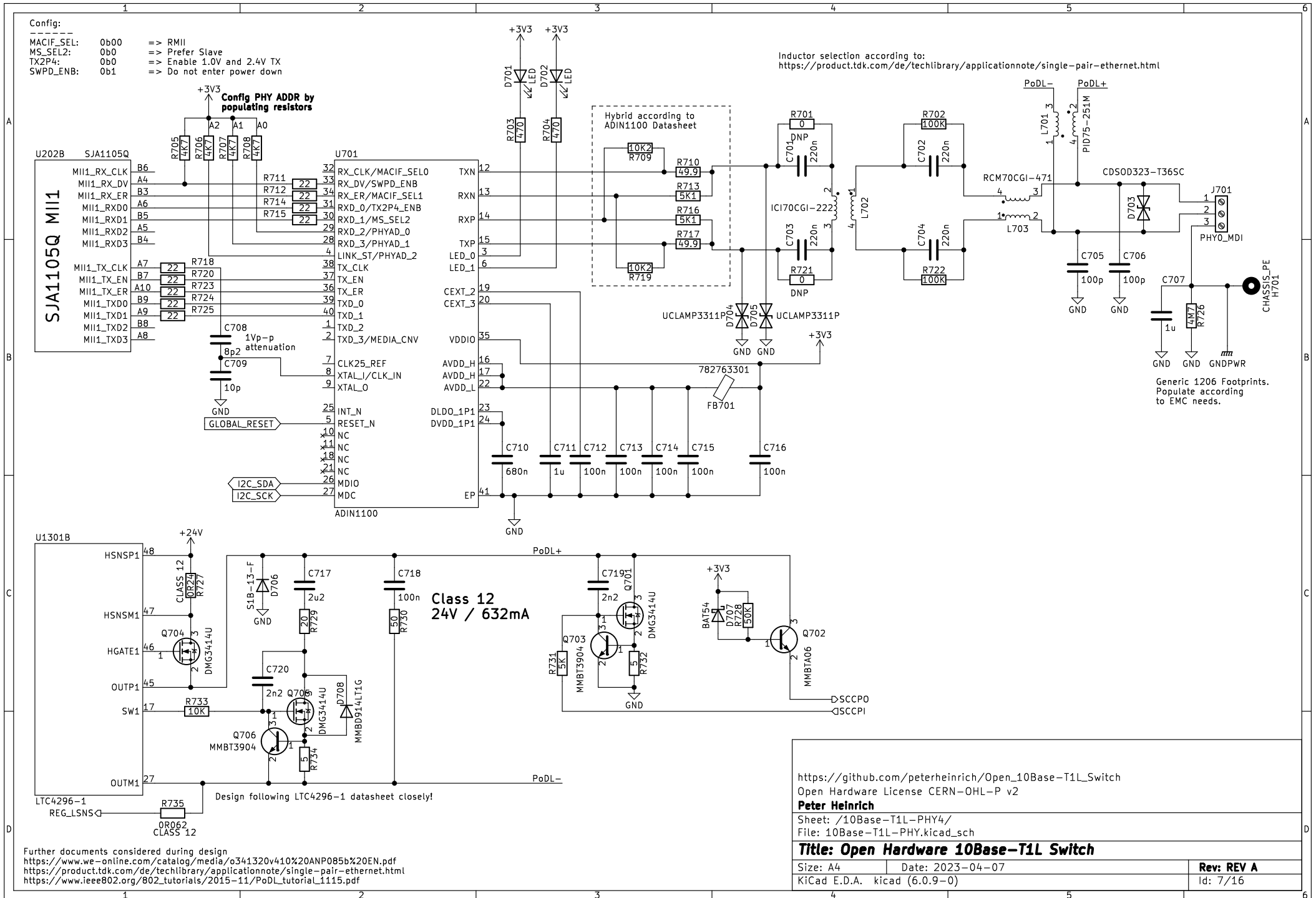
Rev: REV A

Id: 6/16

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

Config PHY ADDR by
 populating resistors

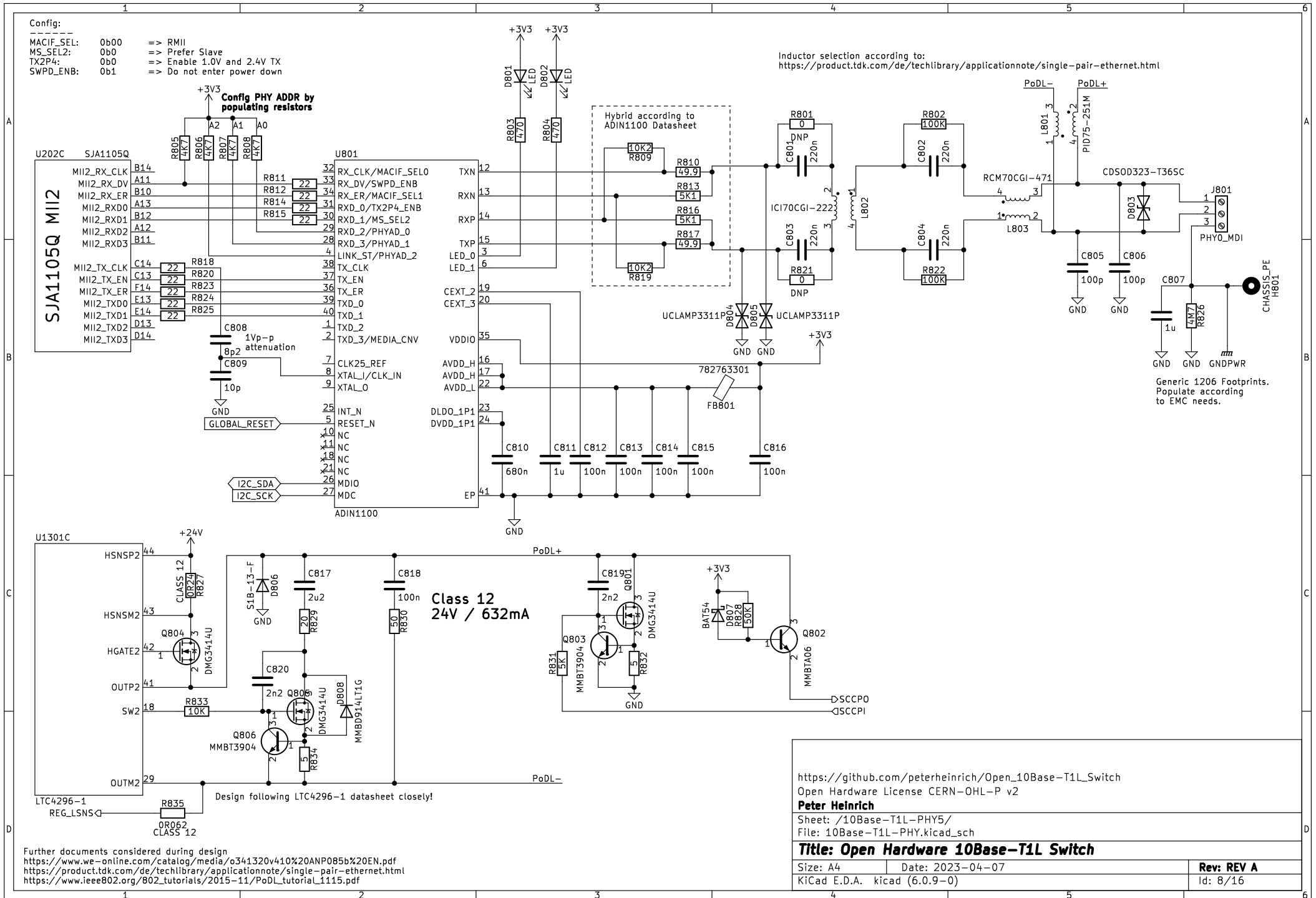
Inductor selection according to:
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>



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

Config PHY ADDR by
 populating resistors

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

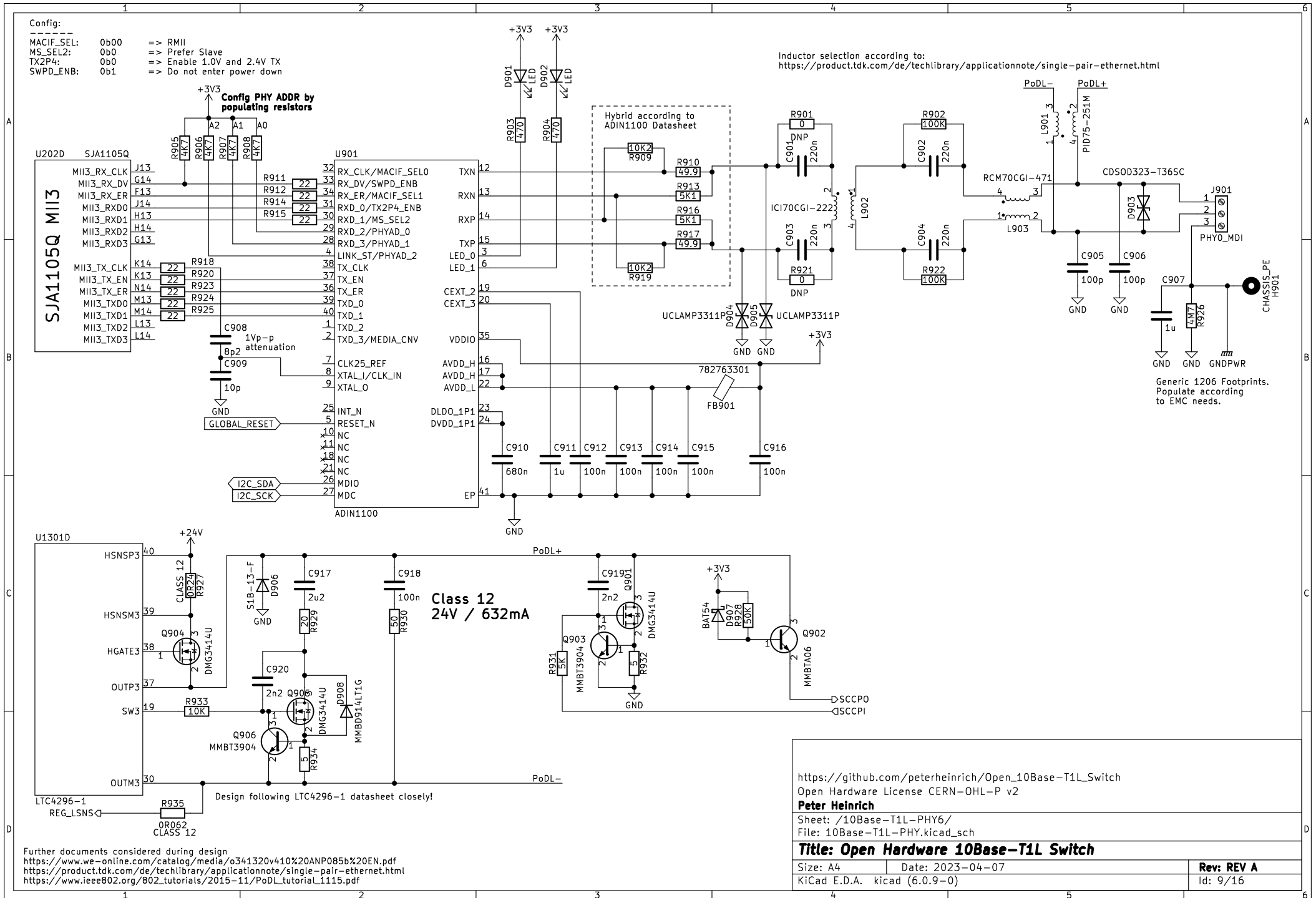


Further documents considered during design
<https://www.we-online.com/catalog/media/o341320v410%20ANP085b%20EN.pdf>
<https://product.tdk.com/de/techlibrary/applicationnote/single-pair-ethernet.html>
https://www.ieee802.org/802_tutorials/2015-11/PoDL_tutorial1.1115.pdf

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

Config PHY ADDR by
 populating resistors

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

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

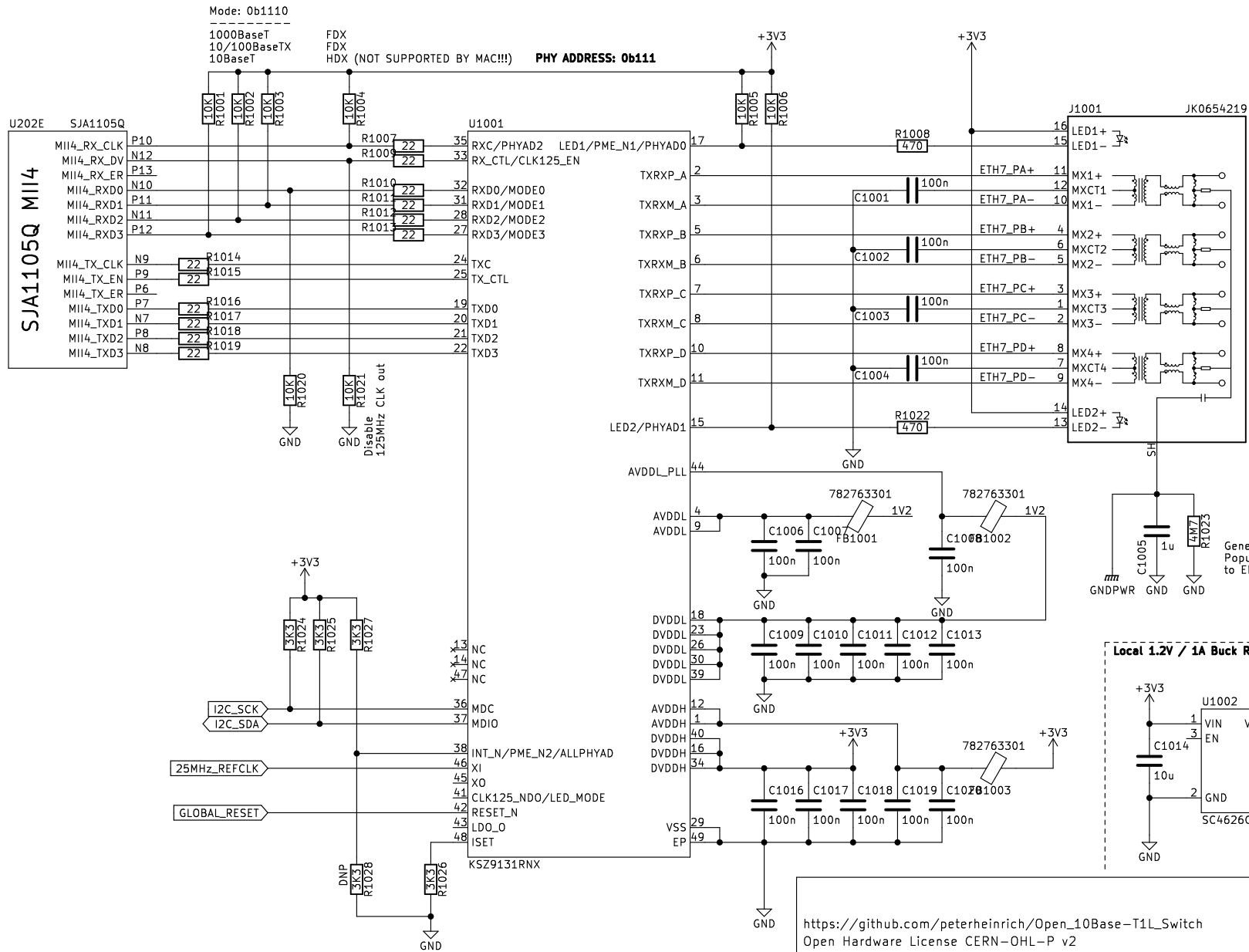
Title: Open Hardware 10Base-T1L Switch

Size: A4 Date: 2023-04-07

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Rev: REV A

Id: 9/16



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Sheet: /100Base-TX-PHY7/

File: 100Base-TX-PHY7.kicad_sch

Title: Open Hardware 10Base-T1L Switch

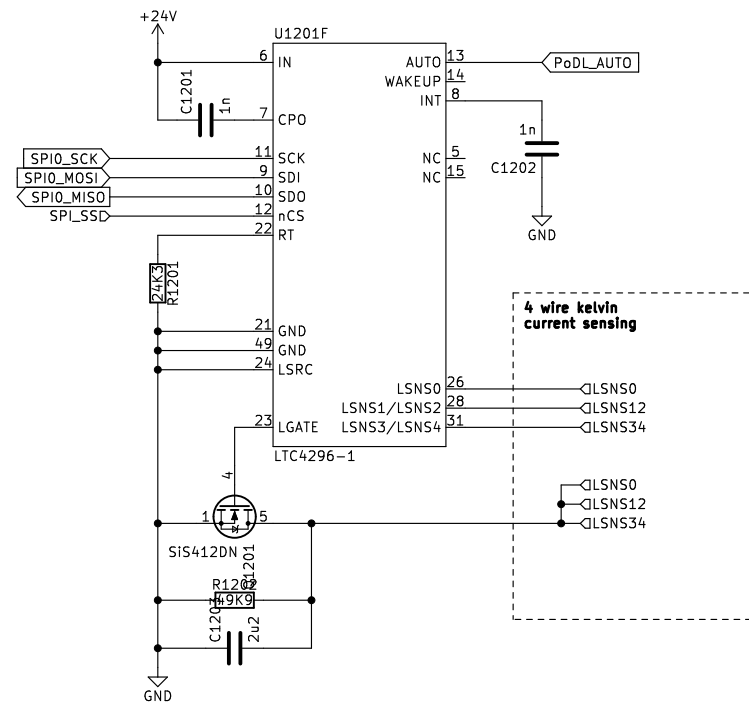
Size: A4

Date: 2023-04-07

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Rev: REV A

Id: 10/16



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Sheet: /PoDL_REG0/

File: PoDL_REG.kicad_sch

Title: Open Hardware 10Base-T1L Switch

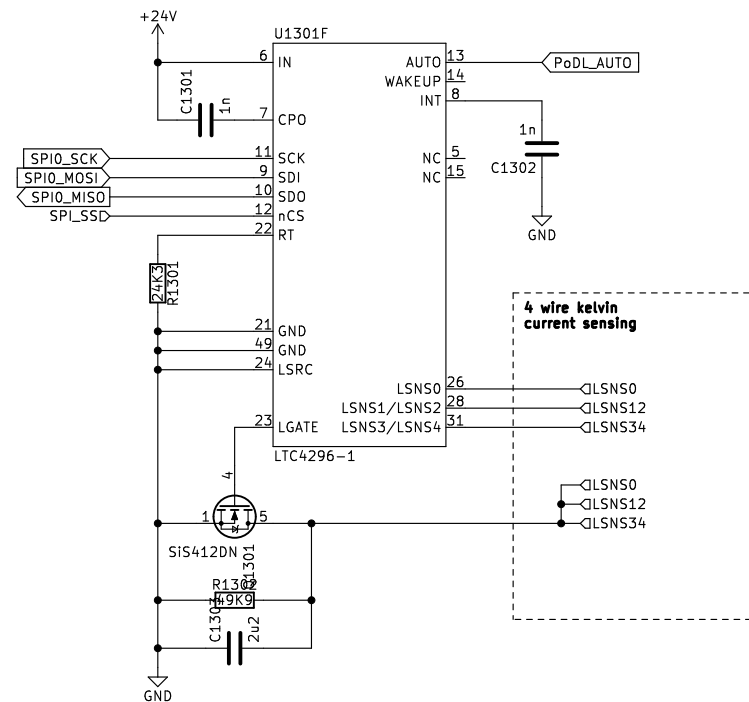
Size: A4

Date: 2023-04-07

Rev: REV A

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Id: 12/16



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Sheet: /PoDL_REG1/

File: PoDL_REG.kicad_sch

Title: Open Hardware 10Base-T1L Switch

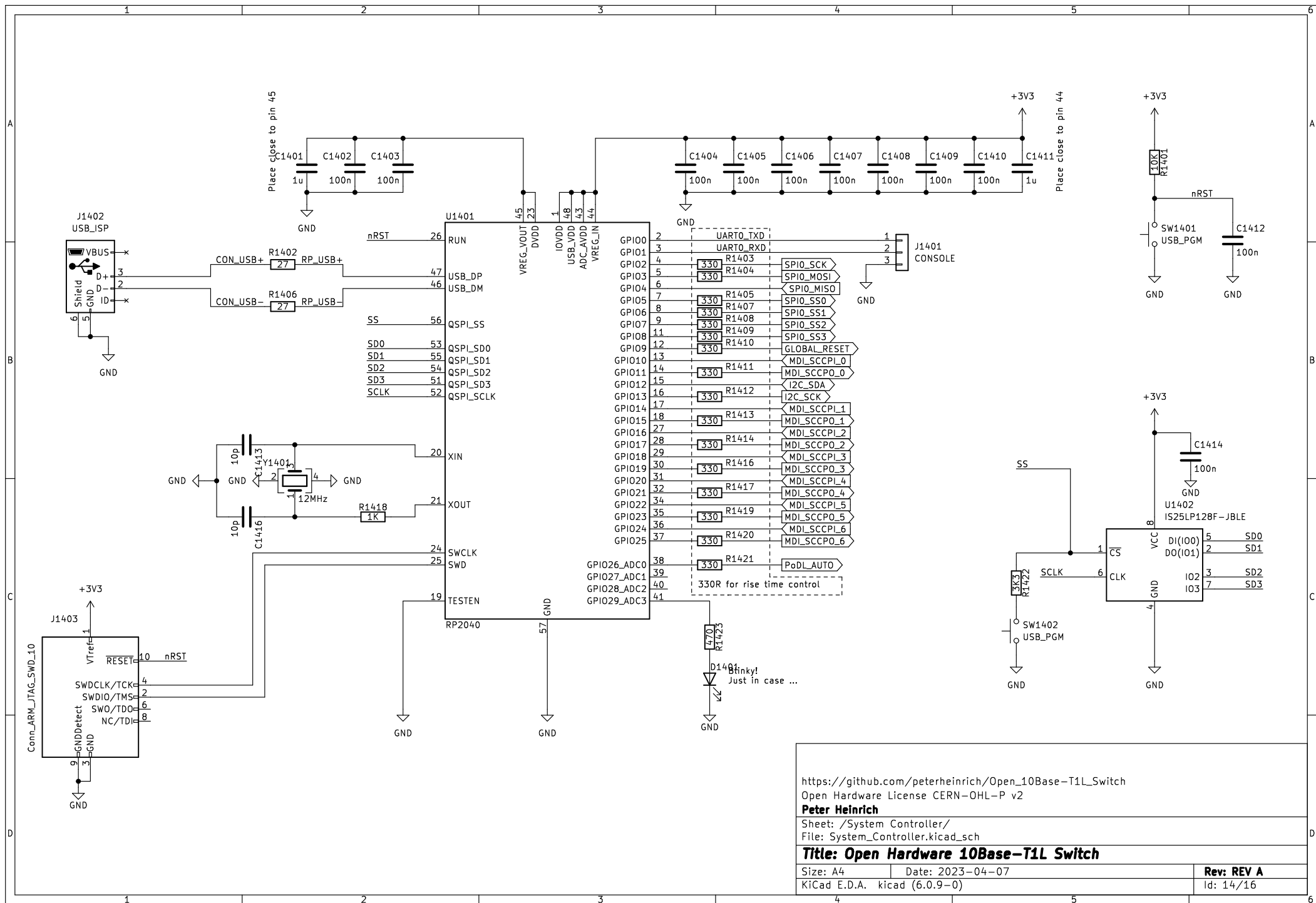
Size: A4

Date: 2023-04-07

Rev: REV A

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Id: 13/16



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Sheet: /System Controller/

File: System_Controller.kicad_sch

Title: Open Hardware 10Base-T1L Switch

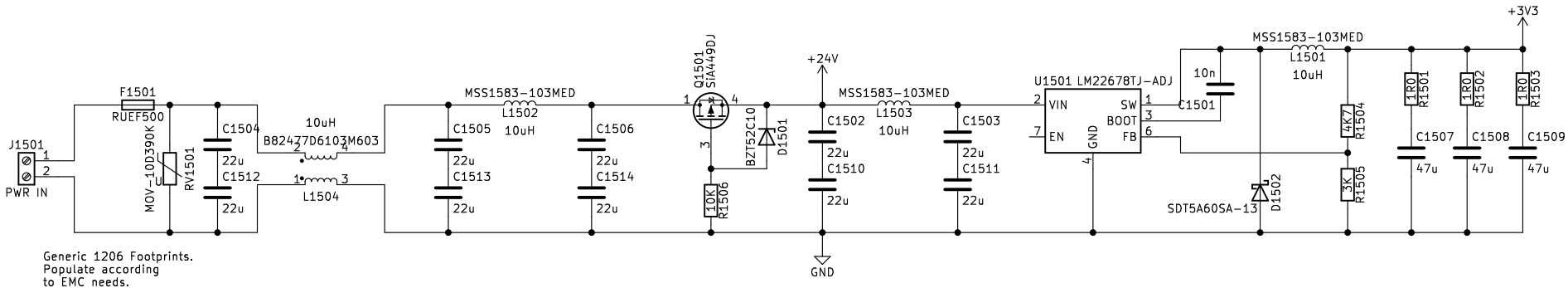
Size: A4 Date: 2023-04-07

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

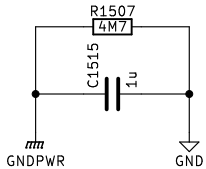
Rev: REV A

Id: 14/16

**24V / 5A DC
REGULATED**



Generic 1206 Footprints.
Populate according
to EMC needs.



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Sheet: /Power Supply/

File: Power_Supply.kicad_sch

Title: Open Hardware 10Base-T1L Switch

Size: A4	Date: 2023-04-07
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KiCad E.D.A.	kicad (6.0.9-0)
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Rev: REV A

Id: 15/16

