

**Motor Control Card**

**DC-link current measurement**

DC-current

OverCurrentDetection1 DC (out) < I/O\_DI\_ocrd1-dc

OverCurrentDetection2 DC (out) < I/O\_DI\_ocrd2-dc

current\_DC (out) < I/O\_AI\_current-dc

DC+ (in) > DC+ (in)

I/O\_AI\_vcc-io > Vref

GND (dc-link)

File: DC\_current.kicad\_sch

**DC-link voltage measurement**

DC-link voltage measurement

MEASURED\_VOLTAGE\_ADC < PC5

MEASURED\_VOLTAGE\_BRAKE < DC-LINK-VOLTAGE

InputVoltage (+) < InputVoltage (+)

InputVoltage (-) < InputVoltage (-)

File: GateDriver.kicad\_sch

**DC-link capacitors**

R1.B1 500k

R2.B1 500k

R3.B1 500k

R4.B1 3.75k

C\_dc-link1 14u

C\_dc-link2 14u

C\_dc-link3 14u

C\_dc-link4 14u

R\_DC-link\_1 ???

R\_DC-link\_2 ???

R\_DC-link\_3 ???

R\_DC-link\_4 ???

J12 5019

**GateDriver1**

COM (2) > COM HS

COM (1) > COM LS

I/O\_DO\_INHS-1 > INHS

I/O\_DO\_INLS-1 > INLS

I/O\_DI\_RDY-1 > RDY

I/O\_DI\_FLT-1 > /FLT

I/O\_DO\_RS-1 > /RS

VCC2HS < +15 V (2)

VCC2LS < +15 V (1)

VEE2HS < -8.7 V (2)

VEE2LS < -8.7 V (1)

GND2HS < TA+1\_LS

GND2LS < GND (dc-link)

OUTHHS < TA+1\_HS

OUTLS < TA-1\_HS

File: GateDriver1.kicad\_sch

**GateDriver2**

COM (4) > COM HS

COM (3) > COM LS

I/O\_DO\_INHS-2 > INHS

I/O\_DO\_INLS-2 > INLS

I/O\_DI\_RDY-2 > RDY

I/O\_DI\_FLT-2 > /FLT

I/O\_DO\_RS-2 > /RS

VCC2HS < +15 V (4)

VCC2LS < +15 V (3)

VEE2HS < -8.7 V (4)

VEE2LS < -8.7 V (3)

GND2HS < TB+1\_LS

GND2LS < GND (dc-link)

OUTHHS < TB+1\_HS

OUTLS < TB-1\_HS

File: GateDriver1.kicad\_sch

**GateDriver3**

COM (6) > COM HS

COM (5) > COM LS

I/O\_DO\_INHS-3 > INHS

I/O\_DO\_INLS-3 > INLS

I/O\_DI\_RDY-3 > RDY

I/O\_DI\_FLT-3 > /FLT

I/O\_DO\_RS-3 > /RS

VCC2HS < +15 V (6)

VCC2LS < +15 V (5)

VEE2HS < -8.7 V (6)

VEE2LS < -8.7 V (5)

GND2HS < TC+1\_LS

GND2LS < GND (dc-link)

OUTHHS < TC+1\_HS

OUTLS < TC-1\_HS

File: GateDriver1.kicad\_sch

**Braking system (Currently not in use)**

Braking

+15 V (6) > +15 V (6)

COM (6) > COM (6)

DC-LINK (+) < DC-LINK (+)

I/O\_DI\_braking-active > Braking\_active

DC-LINK-VOLTAGE > Voltage\_bridge\_input

DC-LINK (-) < DC-LINK (-)

File: Braking.kicad\_sch

**Power Supplies**

PowerSupply

+5 V < +5 V

GND (+5 V) < GND (+5 V)

+3.3 V < +3.3 V

GND (+3.3 V) < GND (+3.3 V)

File: PowerSupply.kicad\_sch

**GateDriverPwrSply**

+15 V (1) < +15 V (1)

COM (1) < COM (1)

-8.7 V (1) < -8.7 V (1)

+15 V (2) < +15 V (2)

COM (2) < COM (2)

-8.7 V (2) < -8.7 V (2)

+15 V (3) < +15 V (3)

COM (3) < COM (3)

-8.7 V (3) < -8.7 V (3)

+15 V (4) < +15 V (4)

COM (4) < COM (4)

-8.7 V (4) < -8.7 V (4)

+15 V (5) < +15 V (5)

COM (5) < COM (5)

-8.7 V (5) < -8.7 V (5)

+15 V (6) < +15 V (6)

COM (6) < COM (6)

-8.7 V (6) < -8.7 V (6)

File: GateDriverPwrSply.kicad\_sch

**Encoder**

Encoder

H6

H7

H8

H9

File: Encoder.sch.kicad\_sch

**Microcontroller**

I/O\_DO\_INLS-1 < I/O\_DO\_INLS-1

I/O\_DO\_INLS-2 < I/O\_DO\_INLS-2

I/O\_DO\_INLS-3 < I/O\_DO\_INLS-3

I/O\_DO\_INHS-1 < I/O\_DO\_INHS-1

I/O\_DO\_INHS-2 < I/O\_DO\_INHS-2

I/O\_DO\_INHS-3 < I/O\_DO\_INHS-3

I/O\_DO\_RS-1 < I/O\_DO\_RS-1

I/O\_DO\_RS-2 < I/O\_DO\_RS-2

I/O\_DO\_RS-3 < I/O\_DO\_RS-3

I/O\_DI\_RDY-1 < I/O\_DI\_RDY-1

I/O\_DI\_RDY-2 < I/O\_DI\_RDY-2

I/O\_DI\_RDY-3 < I/O\_DI\_RDY-3

I/O\_DI\_FLT-1 < I/O\_DI\_FLT-1

I/O\_DI\_FLT-2 < I/O\_DI\_FLT-2

I/O\_DI\_FLT-3 < I/O\_DI\_FLT-3

I/O\_DI\_ocrd1-dc < I/O\_DI\_ocrd1-dc

I/O\_DI\_ocrd1-L1 < I/O\_DI\_ocrd1-L1

I/O\_DI\_ocrd1-L2 < I/O\_DI\_ocrd1-L2

I/O\_DI\_ocrd1-L3 < I/O\_DI\_ocrd1-L3

I/O\_DI\_ocrd2-dc < I/O\_DI\_ocrd2-dc

I/O\_DI\_ocrd2-L1 < I/O\_DI\_ocrd2-L1

I/O\_DI\_ocrd2-L2 < I/O\_DI\_ocrd2-L2

I/O\_DI\_ocrd2-L3 < I/O\_DI\_ocrd2-L3

I/O\_AI\_current-dc < I/O\_AI\_current-dc

I/O\_AI\_current-L1 < I/O\_AI\_current-L1

I/O\_AI\_current-L2 < I/O\_AI\_current-L2

I/O\_AI\_current-L3 < I/O\_AI\_current-L3

I/O\_AI\_vcc-io < I/O\_AI\_vcc-io

I/O\_AI\_dc-link-voltage < I/O\_AI\_dc-link-voltage

I/O\_DI\_sw-1 < I/O\_DI\_sw-1

I/O\_DI\_sw-2 < I/O\_DI\_sw-2

I/O\_DI\_sw-3 < I/O\_DI\_sw-3

I/O\_DO\_led-1 < I/O\_DO\_led-1

I/O\_DO\_led-2 < I/O\_DO\_led-2

I/O\_DO\_led-3 < I/O\_DO\_led-3

I/O\_DI\_braking-active < I/O\_DI\_braking-active

I2C\_SDA-display < I/O\_I2C\_SDA\_display

I2C\_SCL-display < I/O\_I2C\_SCL\_display

I/O\_DI\_enc\_A1 < I/O\_DI\_enc\_A1

I/O\_DI\_enc\_B1 < I/O\_DI\_enc\_B1

I/O\_DI\_enc\_E1 < I/O\_DI\_enc\_E1

File: Microcontroller.kicad\_sch

**Output PE**

WAGO\_2606-1101

J1

**Output L1**

WAGO\_2606-1101

J2

**Output L2**

WAGO\_2606-1101

J3

**Output L3**

WAGO\_2606-1101

J4

**ELECTRIC THREE PHASE INDUCTION MOTOR**

RM1

LM1

RM2

LM2

RM3

LM3

**CurrentMeasurement**

L1 (out) < L1 (in)

L2 (out) < L2 (in)

L3 (out) < L3 (in)

current\_L1 (out) < I/O\_AI\_current-L1

current\_L2 (out) < I/O\_AI\_current-L2

current\_L3 (out) < I/O\_AI\_current-L3

Vcc-Ioc < I/O\_AI\_vcc-io

OverCurrentDetection1 L1 (out) < I/O\_DI\_ocrd1-L1

OverCurrentDetection1 L2 (out) < I/O\_DI\_ocrd1-L2

OverCurrentDetection1 L3 (out) < I/O\_DI\_ocrd1-L3

OverCurrentDetection2 L1 (out) < I/O\_DI\_ocrd2-L1

OverCurrentDetection2 L2 (out) < I/O\_DI\_ocrd2-L2

OverCurrentDetection2 L3 (out) < I/O\_DI\_ocrd2-L3

File: CurrentMeasurement.kicad\_sch

**MOUNTING HOLES**

H6

H7

H8

H9

**Sheet: /**

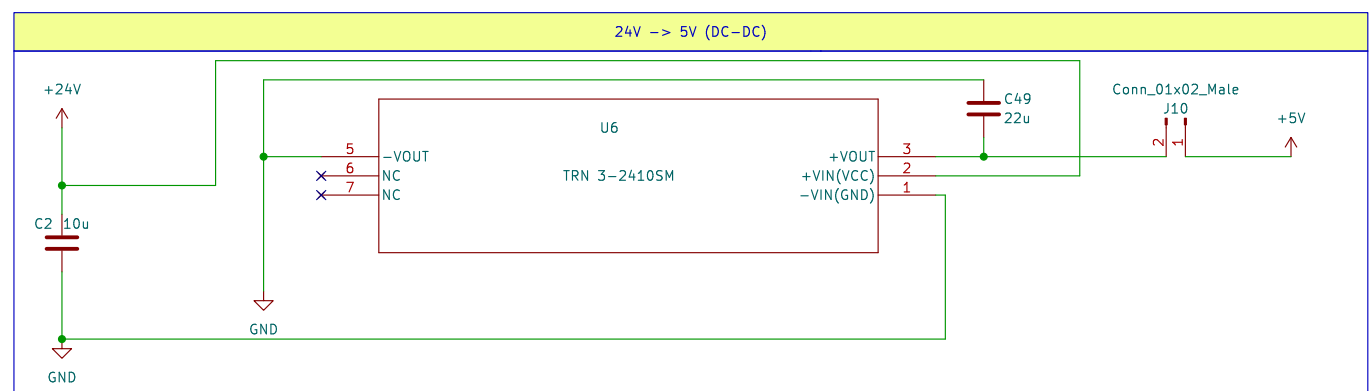
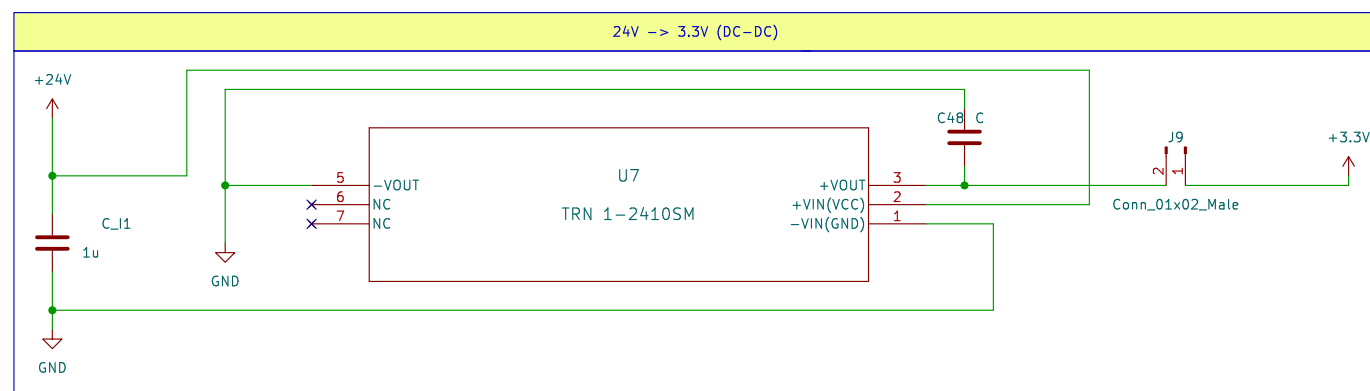
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**Title: 3-phase DC/AC converter with SV-PWM**

Size: A2 | Date: 2023-03-16 | Rev: V. 1.1

KiCad E.D.A. 8.0.8 | Id: 1/12

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Size: A2	Date: 2023-03-16	Rev: V. 1.1	
KiCad E.D.A. 8.0.8		Id: 1/12	

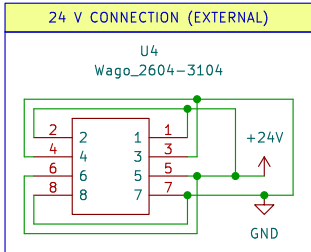


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Ingrid Hovland

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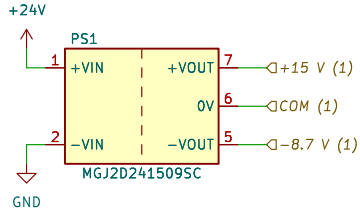
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Size: A2	Date: 2023-03-16	Rev: V. 1.1
KiCad E.D.A. 8.0.8		Id: 2/12

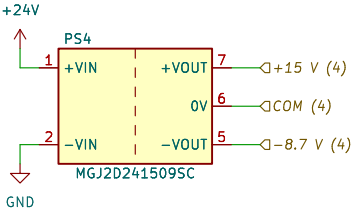


GATE DRIVER POWER SUPPLIES

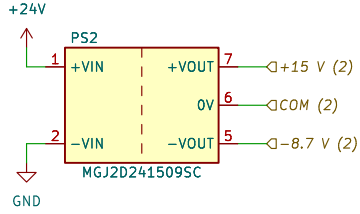
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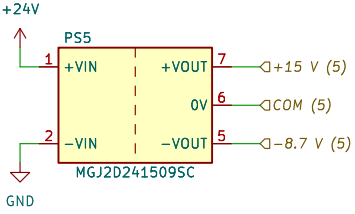
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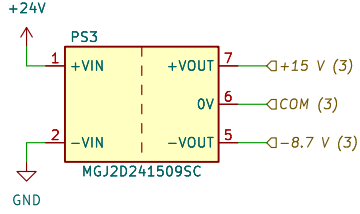
GATE DRIVER PWRSPLY 2



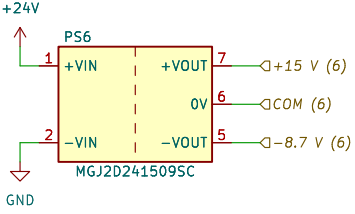
GATE DRIVER PWRSPLY 5



GATE DRIVER PWRSPLY 3



GATE DRIVER PWRSPLY 6



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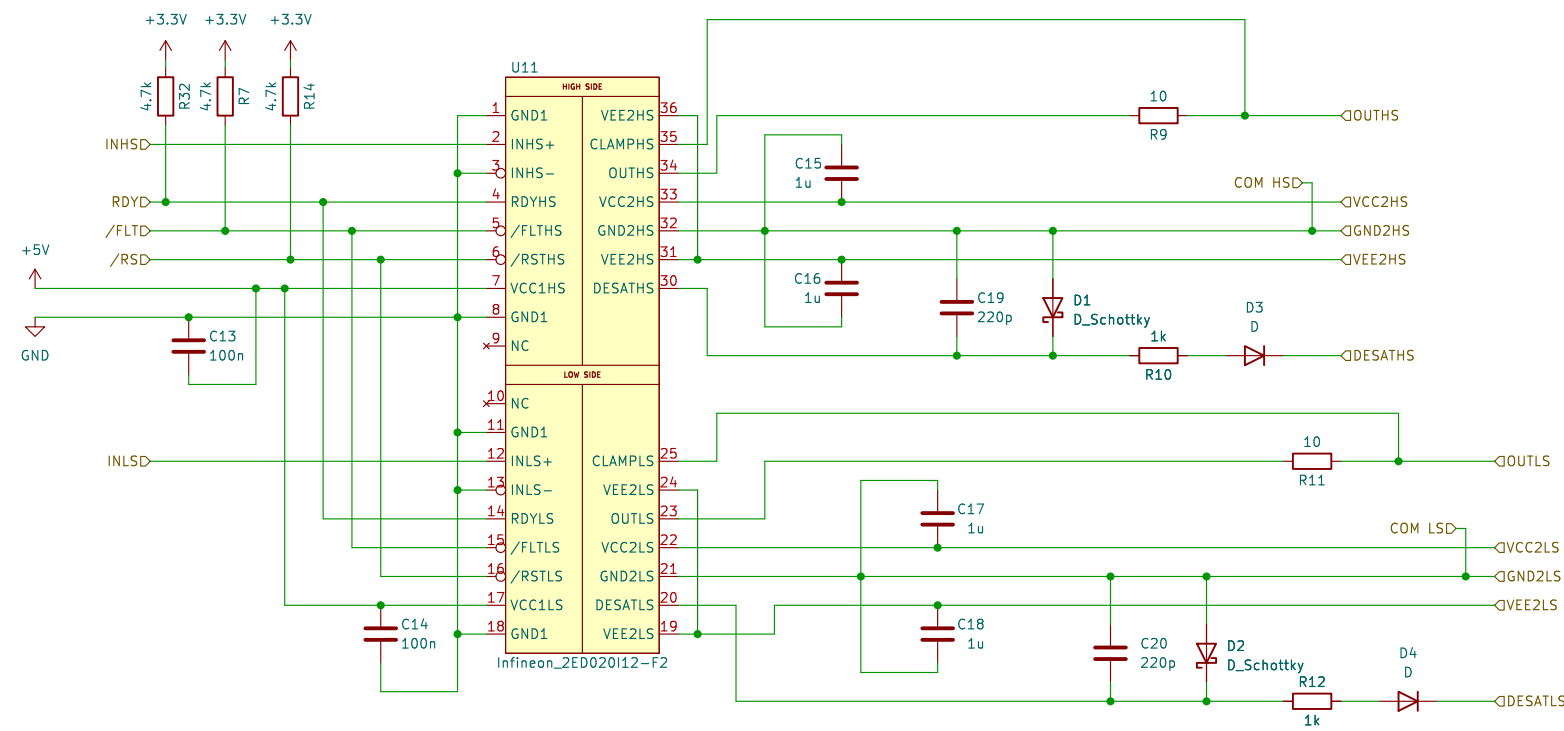
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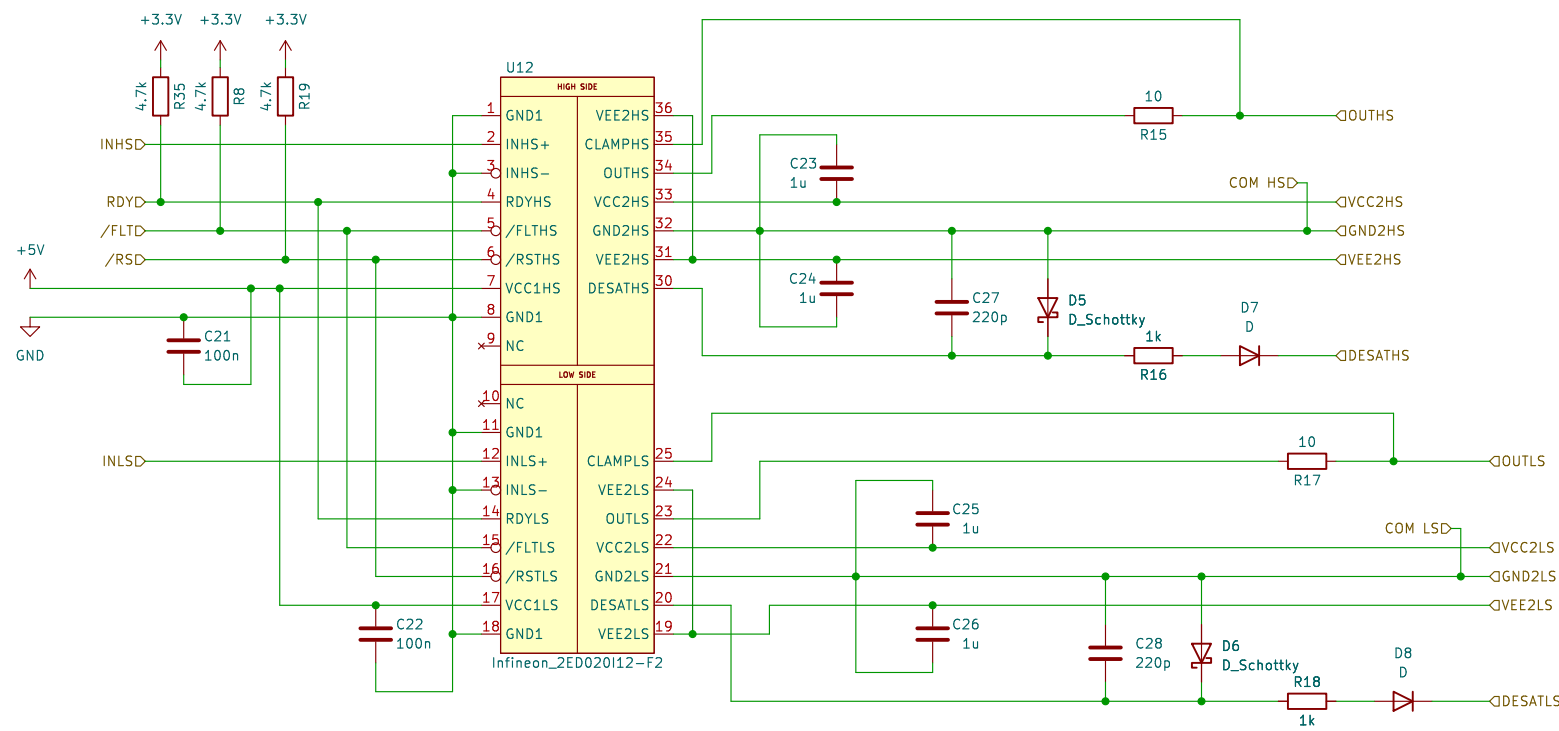
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KiCad E.D.A. 8.0.8

Rev: V. 1.1  
Id: 3/12

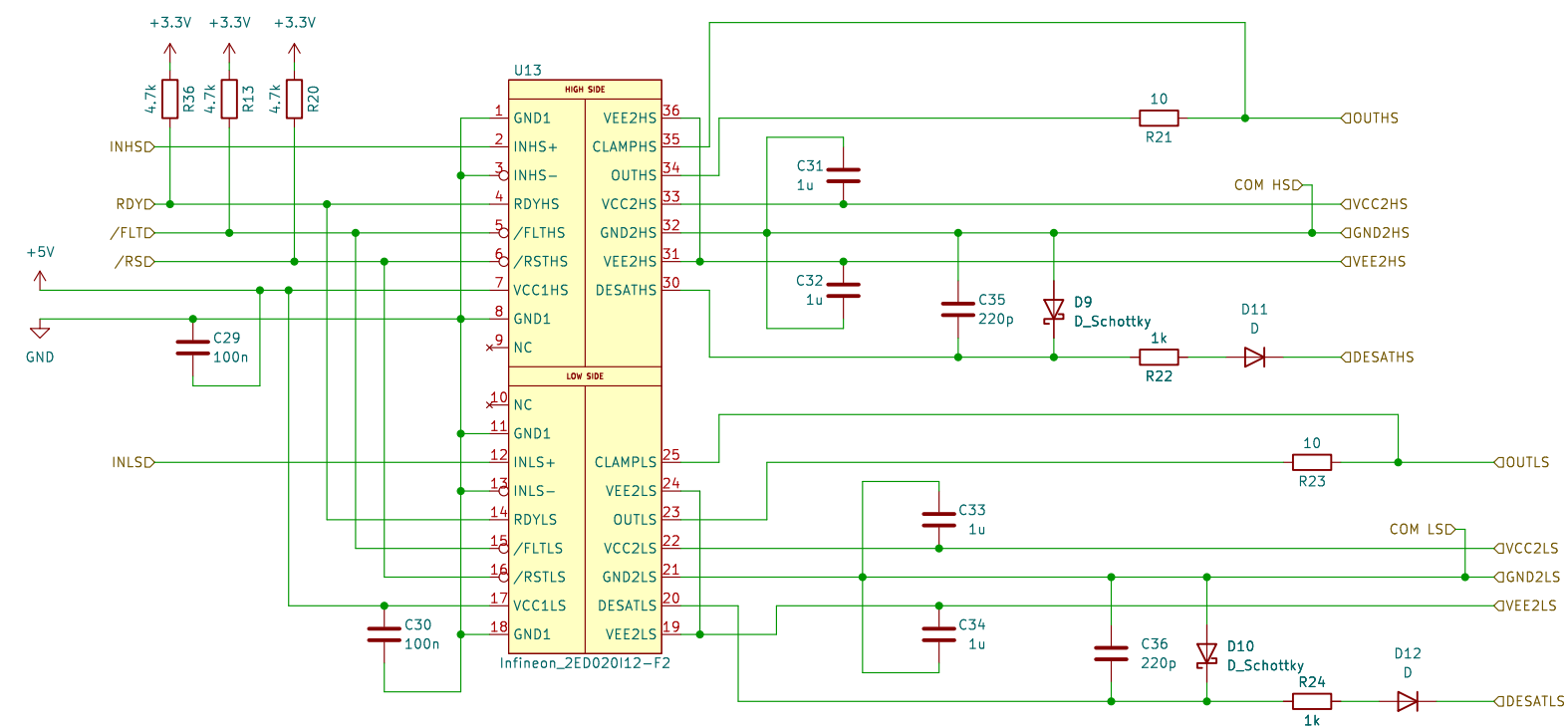
GATE DRIVER CIRCUIT



GATE DRIVER CIRCUIT



## GATE DRIVER CIRCUIT



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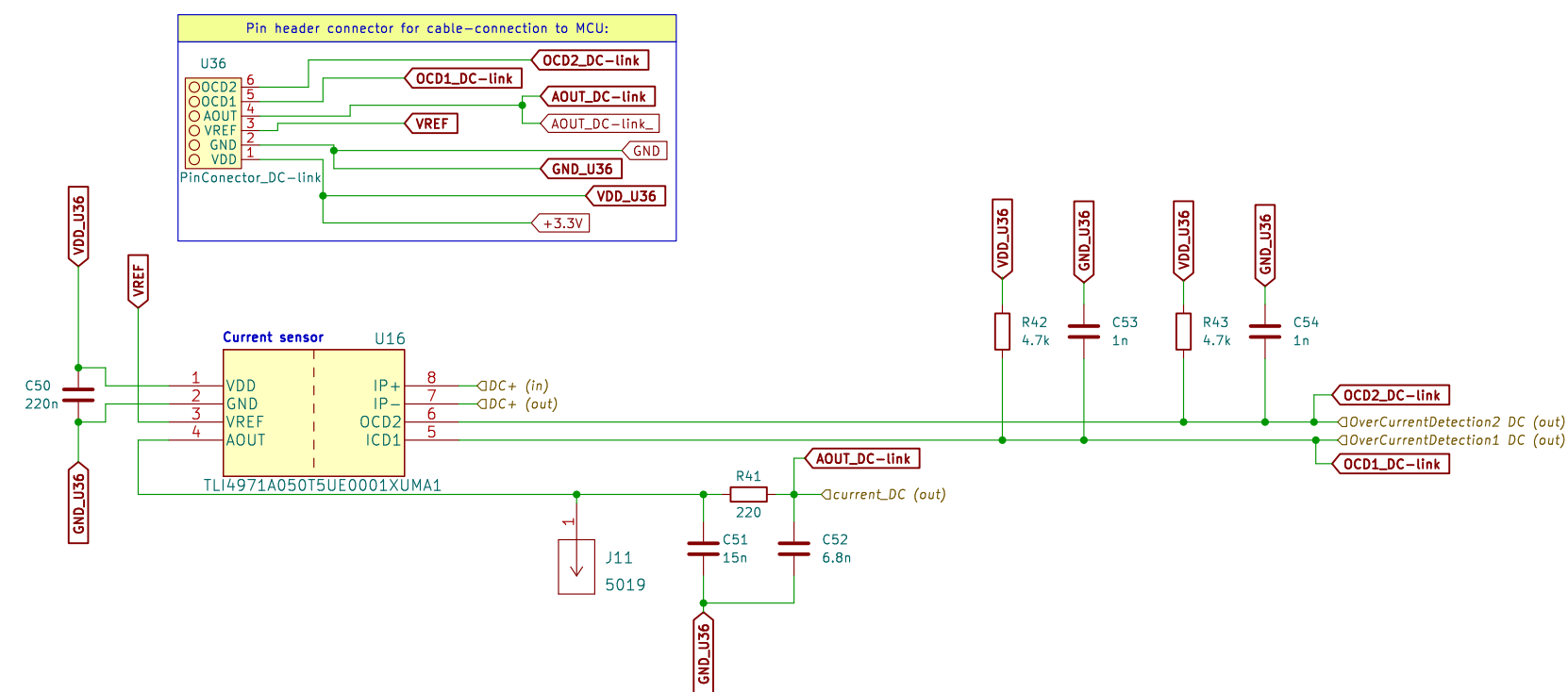
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**Title: 3-phase DC/AC converter with SV-PWM**

Size: A2	Date: 2023-03-16
KiCad E.D.A. 8.0.8	

Rev: V. 1.1  
Id: 6/12





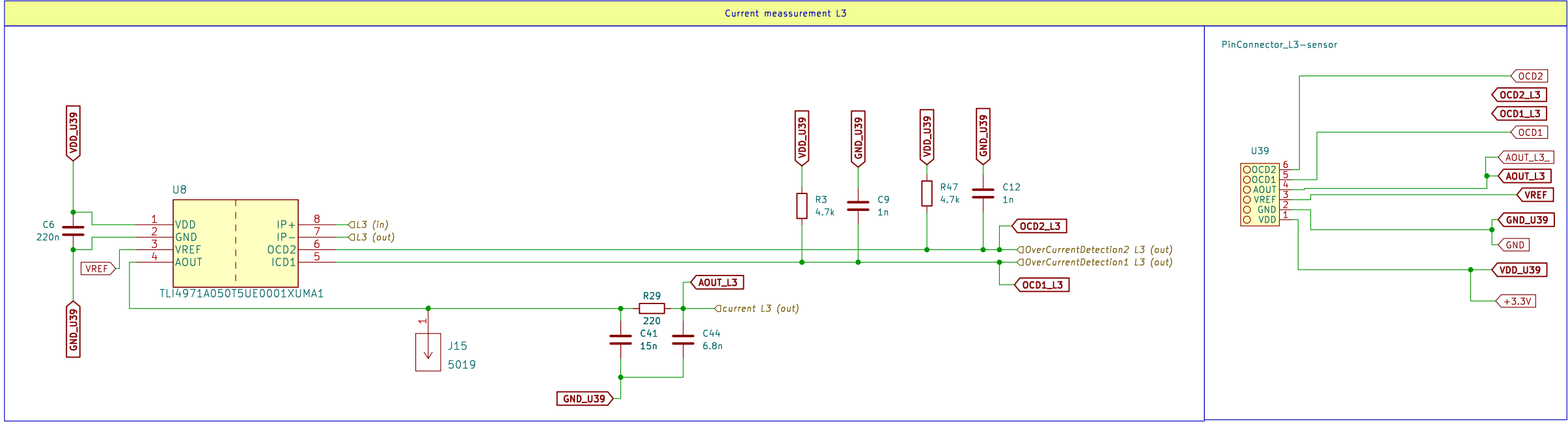
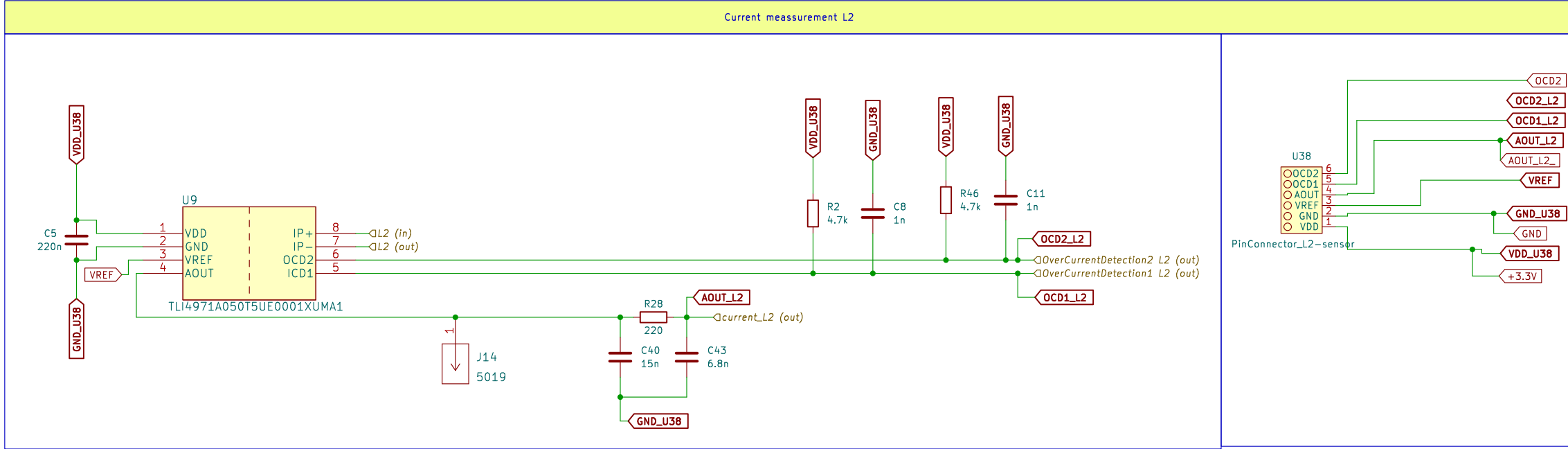
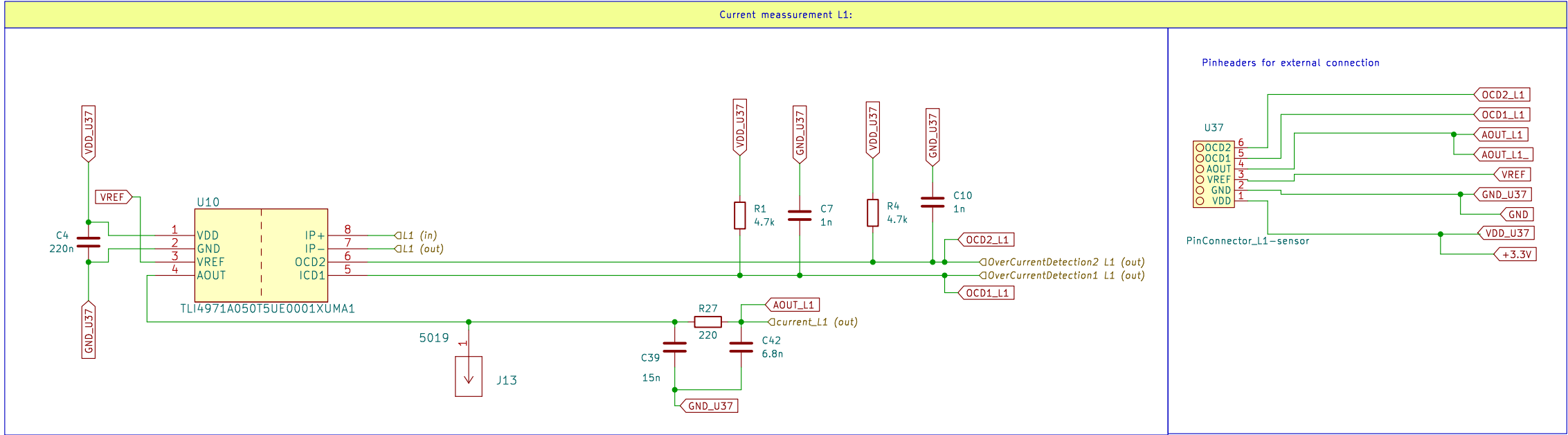
Marius Englund  
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Ingrid Hovland

Sheet: /DC\_current/  
File: DC\_current.kicad\_sch

**Title: 3-phase DC/AC converter with SV-PWM**

Size: A2	Date: 2023-03-16	Rev: V. 1.1
KiCad E.D.A. 8.0.8		Id: 8/12





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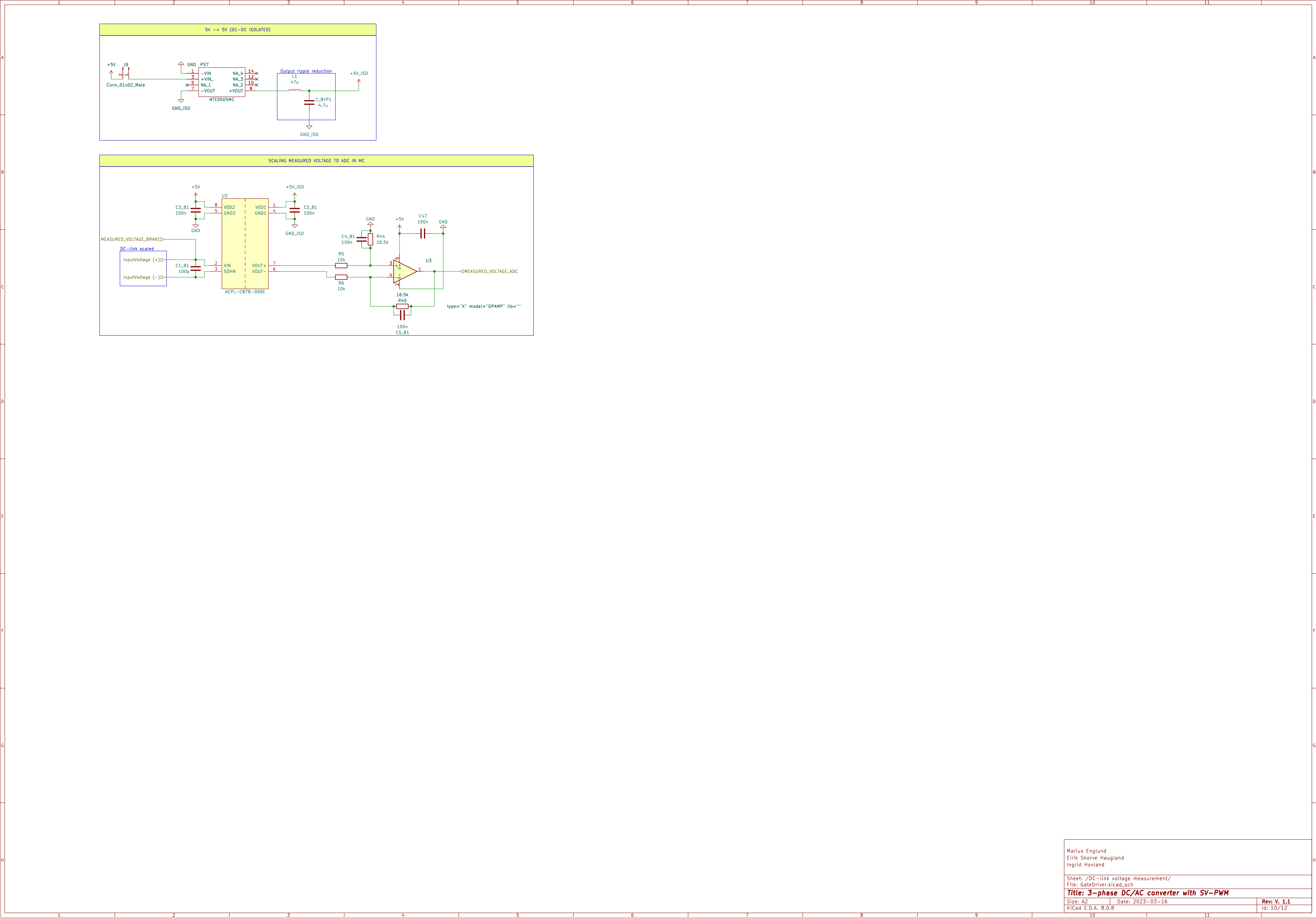
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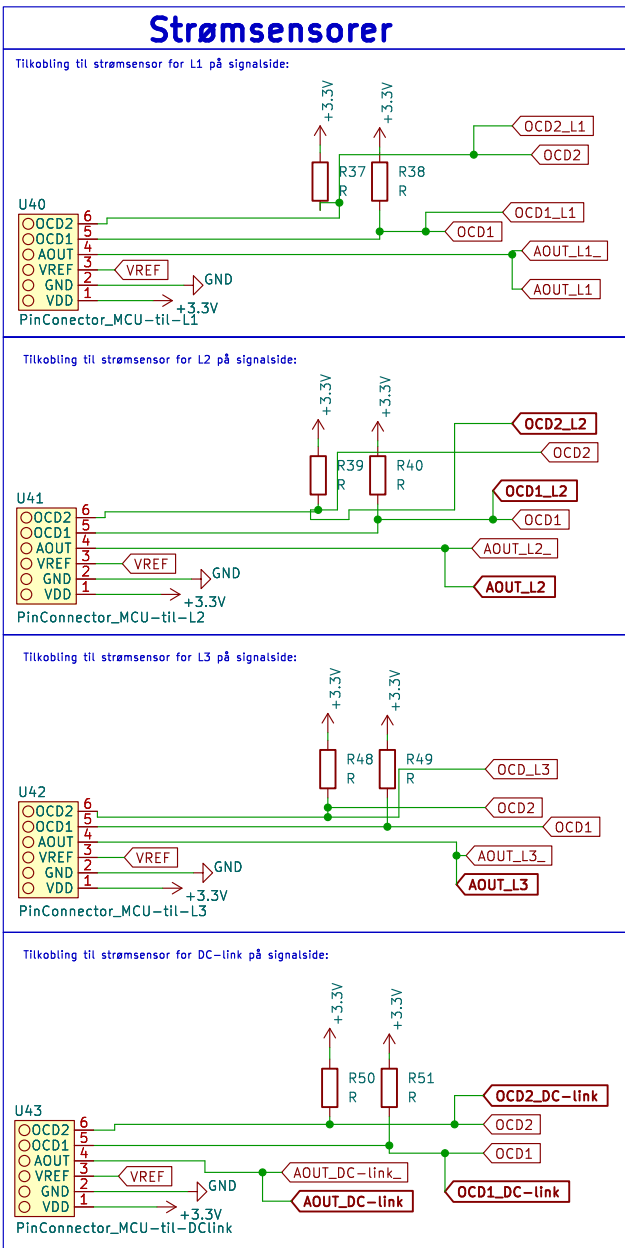
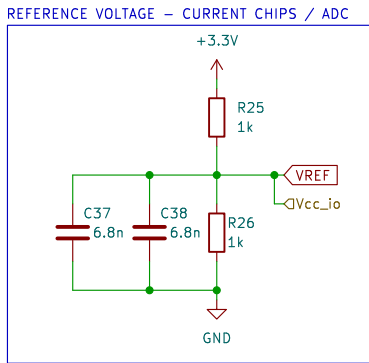
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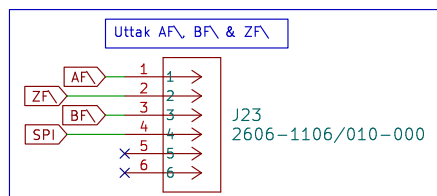
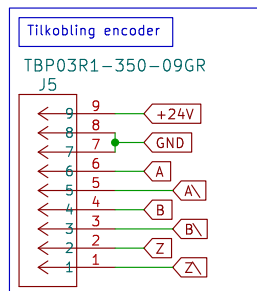
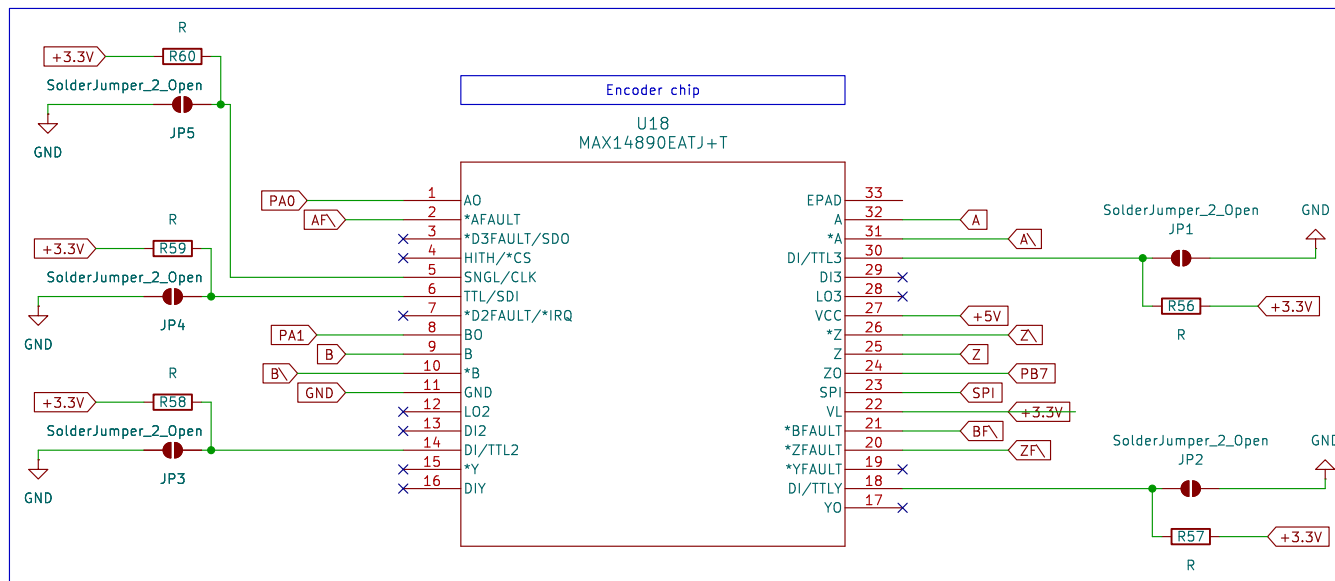
Rev: V. 1.1  
Id: 9/12



The diagram shows the pin connections for the Microcontroller (Nucleo L476RG). The central component is the U1 microcontroller. Connections include:

- Overcurrent detection:** OC01 and OC02 pins are connected to a block labeled "Overcurrent detection from all current sensors".
- Left pin connector:**
  - PC10, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC22, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34, PC35, PC36, PC37, PC38, PC39, PC40, PC41, PC42, PC43, PC44, PC45, PC46, PC47, PC48, PC49, PC50, PC51, PC52, PC53, PC54, PC55, PC56, PC57, PC58, PC59, PC60, PC61, PC62, PC63, PC64, PC65, PC66, PC67, PC68, PC69, PC70, PC71, PC72, PC73, PC74, PC75, PC76, PC77, PC78, PC79, PC80, PC81, PC82, PC83, PC84, PC85, PC86, PC87, PC88, PC89, PC90, PC91, PC92, PC93, PC94, PC95, PC96, PC97, PC98, PC99, PC100, PC101, PC102, PC103, PC104, PC105, PC106, PC107, PC108, PC109, PC110, PC111, PC112, PC113, PC114, PC115, PC116, PC117, PC118, PC119, PC120, PC121, PC122, PC123, PC124, PC125, PC126, PC127, PC128, PC129, PC130, PC131, PC132, PC133, PC134, PC135, PC136, PC137, PC138, PC139, PC140, PC141, PC142, PC143, PC144, PC145, PC146, PC147, PC148, PC149, PC150, PC151, PC152, PC153, PC154, PC155, PC156, PC157, PC158, PC159, PC160, PC161, PC162, PC163, PC164, PC165, 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