

SFH617A-2X009T
CTR 63.125%
 $V_f = 1.35V$
Circuit CTR:
 $I_f = (12V - 1.35V) / 1k = 10.65mA$
 $I_c = 3.3V / 1k = 3.3mA$
CTRc = $3.3 / 10.65 = 30.9\%$
Opto is always in saturation

<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_Actlo.kicad_sch

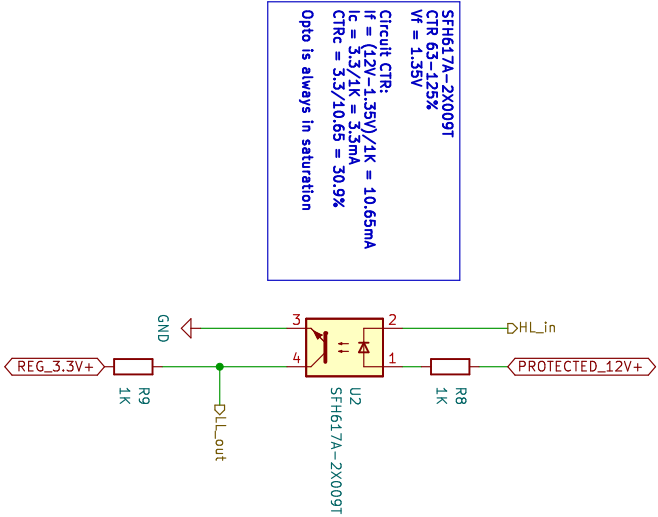
Title: Active Low Optocoupler circuit

Size: A4 Date: 2023-05-14

KiCad E.D.A. kicad (7.0.0)

Rev: 1.2.1

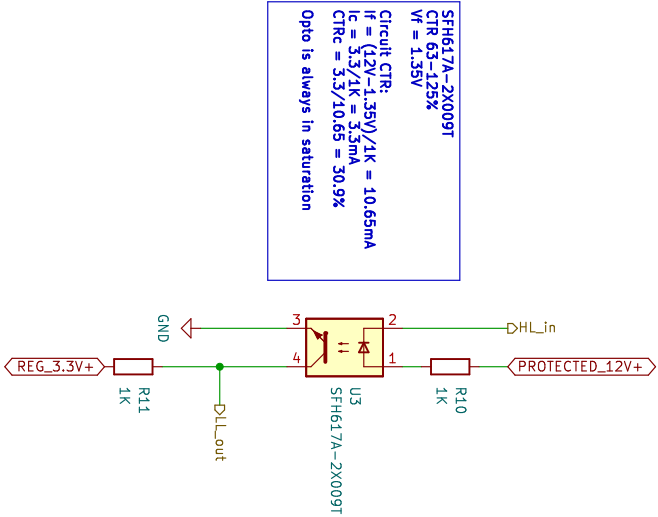
Id: 3/27



SFH617A-2X009T
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<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

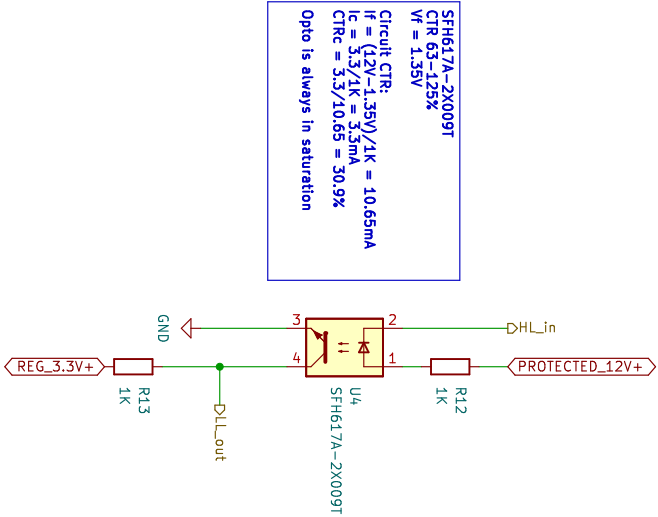
Sheet:	
File: Opto_Actlo.kicad_sch	
Title: Active Low Optocoupler circuit	
Size: A4	Date: 2023-05-14
KiCad E.D.A. kicad (7.0.0)	Rev: 1.2.1 Id: 4/27



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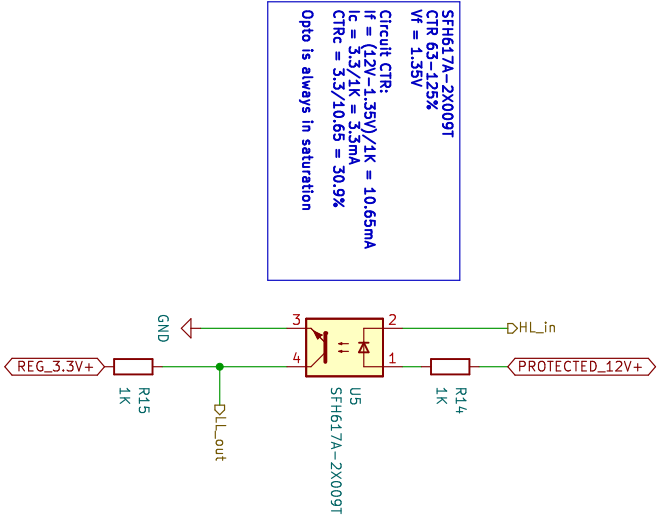
Sheet:	
File: Opto_Actlo.kicad_sch	
Title: Active Low Optocoupler circuit	
Size: A4	Date: 2023-05-14
KiCad E.D.A. kicad (7.0.0)	Rev: 1.2.1 Id: 5/27



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Sheet:	
File: Opto_Actlo.kicad_sch	
Title: Active Low Optocoupler circuit	
Size: A4	Date: 2023-05-14
Kicad E.D.A. kicad (7.0.0)	
Rev: 1.2.1	
Id: 6/27	



<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_Accto.kicad_sch

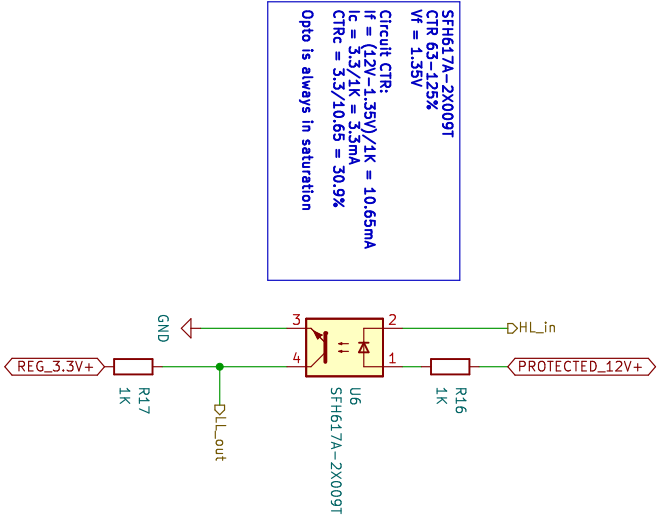
Title: Active Low Optocoupler circuit

Size: A4 Date: 2023-05-14

KiCad E.D.A. kicad (7.0.0)

Rev: 1.2.1

Id: 7/27



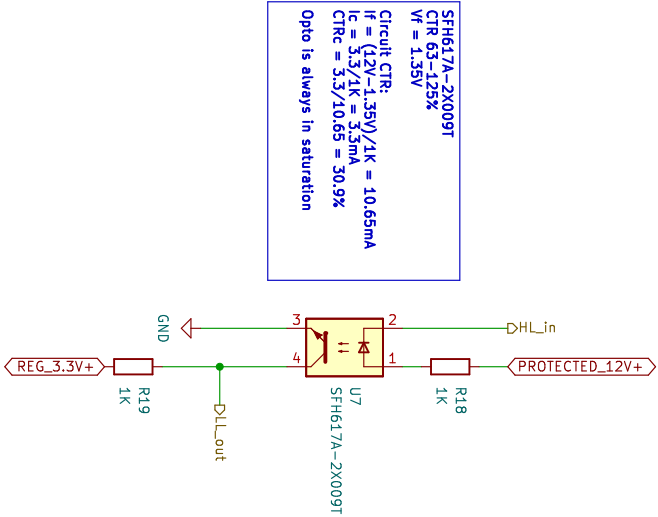
<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_Accto.kicad_sch

Title: Active Low Optocoupler circuit

Size: A4 Date: 2023-05-14
KiCad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 8/27



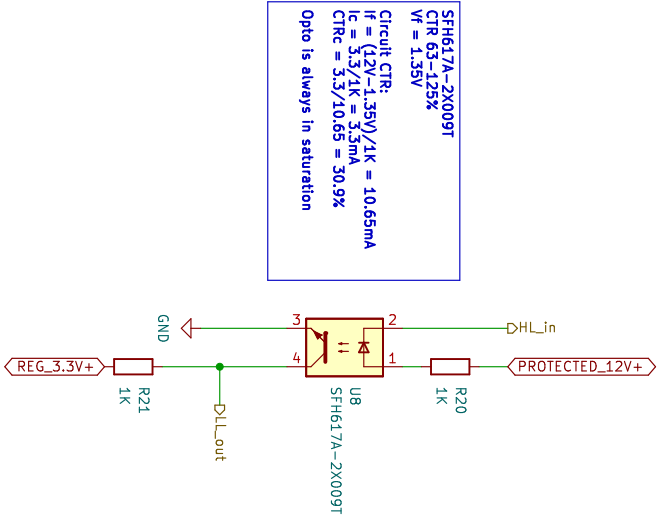
<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_Actlo.kicad_sch

Title: Active Low Optocoupler circuit

Size: A4 Date: 2023-05-14
KiCad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 9/27



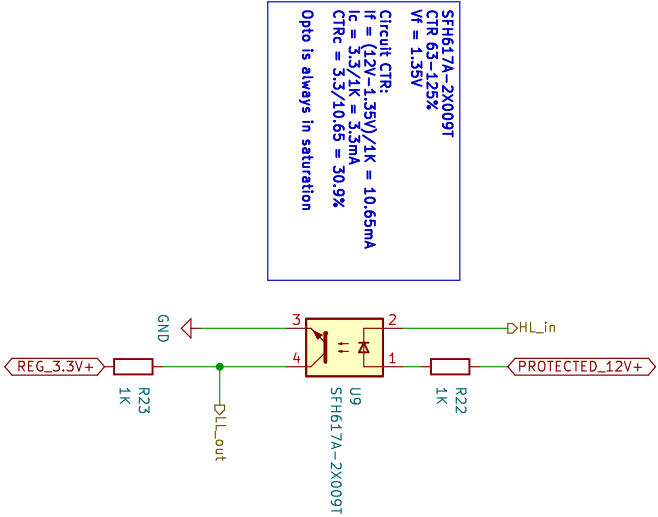
<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_Accto.kicad_sch

Title: Active Low Optocoupler circuit

Size: A4 Date: 2023-05-14
KiCad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 10/27

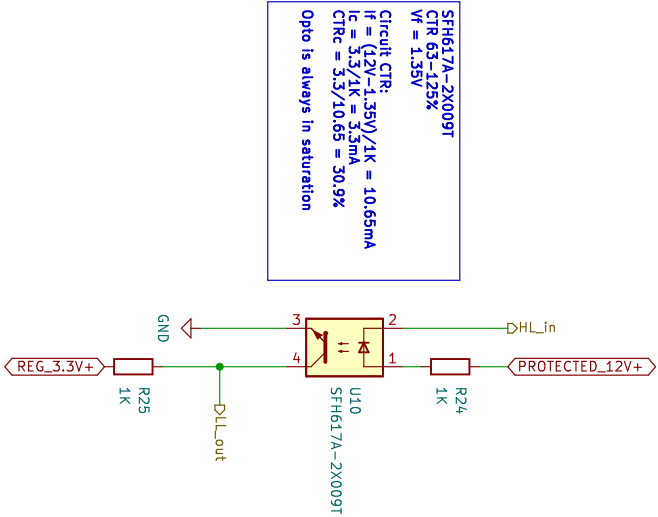


<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_Accto.kicad_sch

Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-05-14	Rev: 1.2.1
KiCad E.D.A. kicad (7.0.0)		Id: 11/27



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Sheet:
File: Opto_Accto.kicad_sch

Title: Active Low Optocoupler circuit

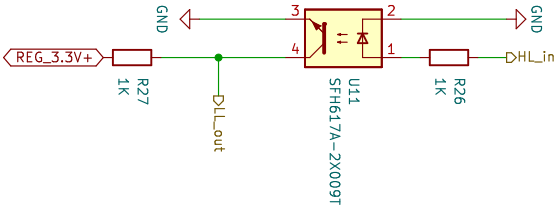
Size: A4 Date: 2023-05-14
KiCad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 12/27

SFH617A-2X009T
CTR 63-125%
 $V_f = 1.35V$

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 $I_f = (12V - 1.35V) / 1K = 10.65mA$
 $I_C = 3.3 / 1K = 3.3mA$
 $CTR_C = 3.3 / 10.65 = 30.9\%$

Opto is always in saturation



<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXxDash>

Sheet:
File: Opto_ActHi.kicad_sch

Title: Active Hi Optocoupler circuit

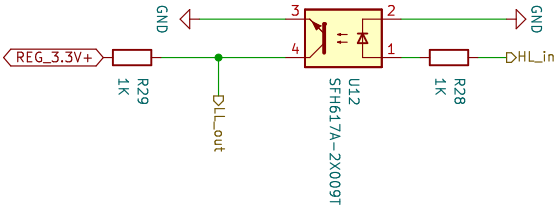
Size: A4
Kicad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 13/27

SFH617A-2X009T
CTR 63-125%
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Circuit CTR:
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<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_ActHi.kicad_sch

Title: Active Hi Optocoupler circuit

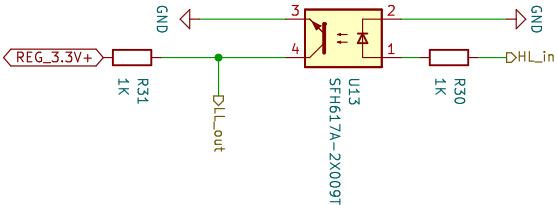
Size: A4
Kicad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 14/27

SFH617A-2X009T
CTR 63-125%
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<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXxDash>

Sheet:
File: Opto_ActHi.kicad_sch

Title: Active Hi Optocoupler circuit

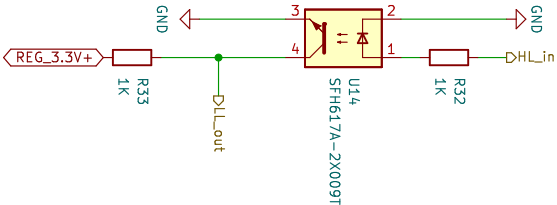
Size: A4
Kicad E.D.A. kicad (7.0.0)

Rev: 1.2.1
Id: 15/27

SFH617A-2X009T
CTR 63-125%
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<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Opto_ActHi.kicad_sch

Title: Active Hi Optocoupler circuit

Size: A4 Date: 2023-05-14

KiCad E.D.A. kicad (7.0.0)

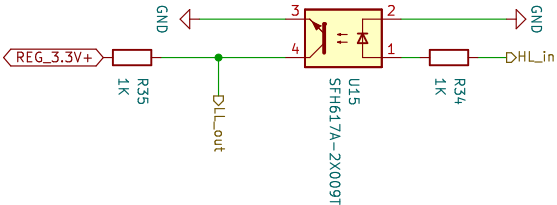
Rev: 1.2.1

Id: 16/27

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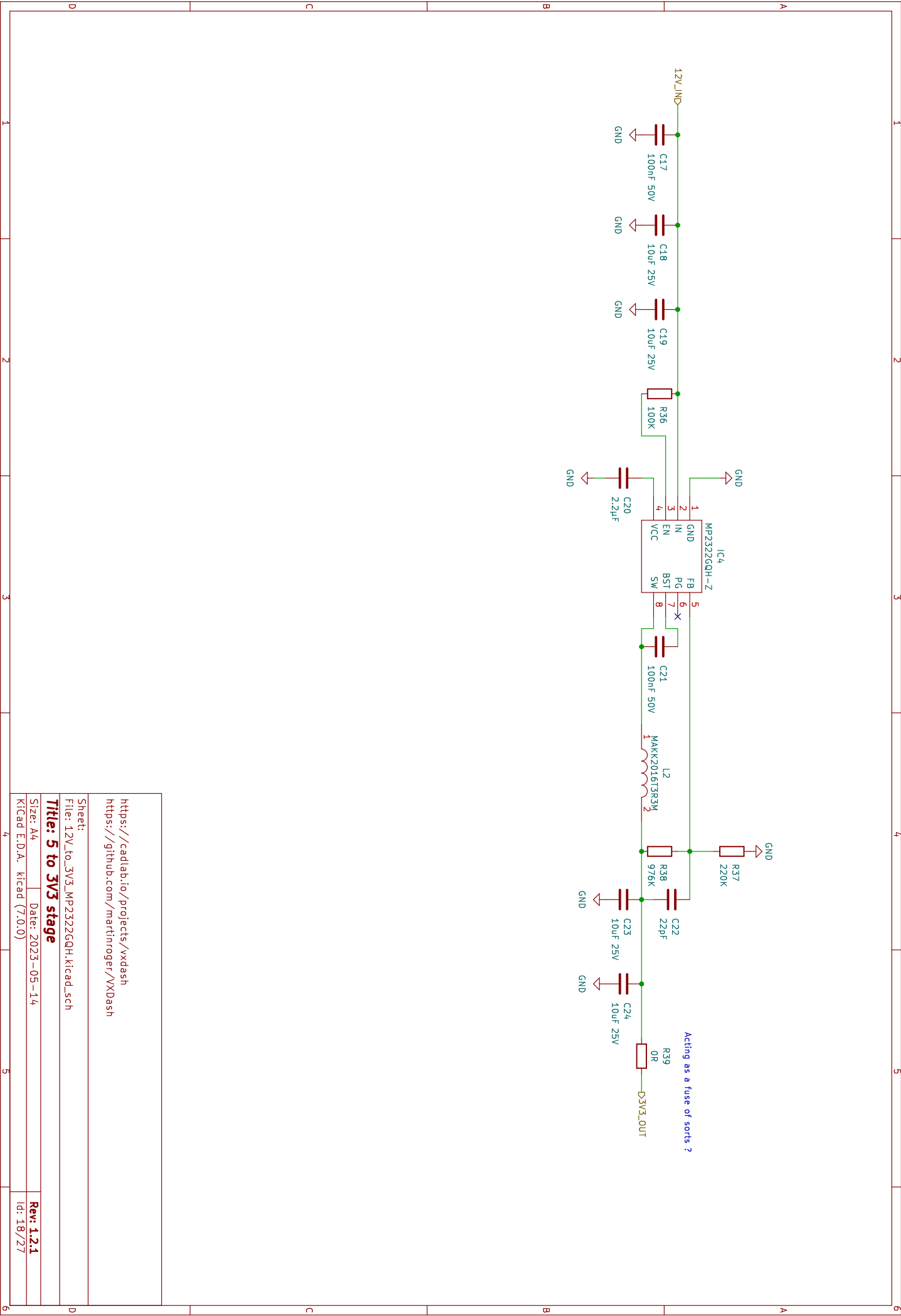
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File: Opto_ActHi.kicad_sch

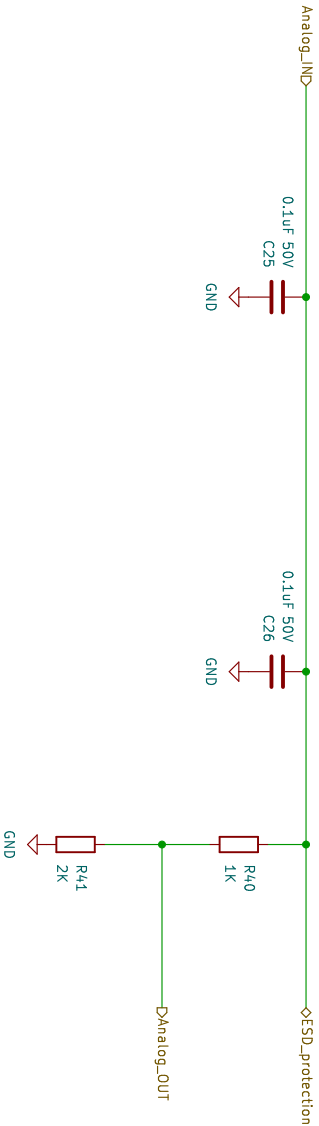
Title: Active Hi Optocoupler circuit

Size: A4
Kicad E.D.A. kicad (7.0.0)

Date: 2023-05-14

Rev: 1.2.1
Id: 17/27



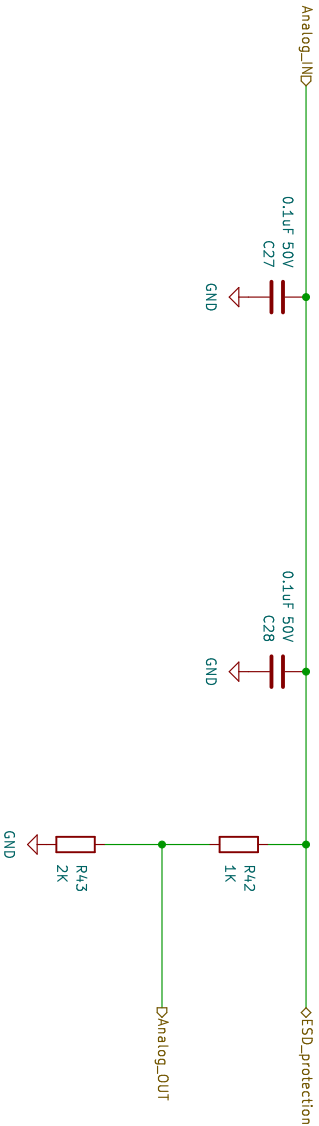


<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-05-14	Rev: 1.2.1
KiCad E.D.A. kicad (7.0.0)		Id: 20/27

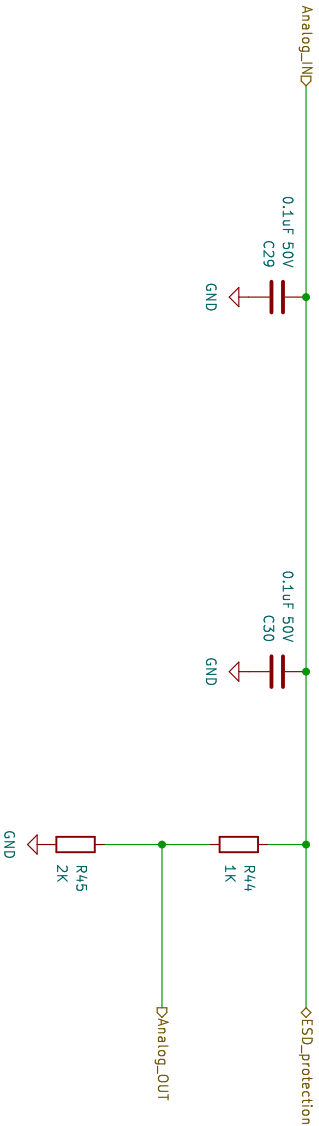


<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

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File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-05-14	Rev: 1.2.1
KiCad E.D.A. kicad (7.0.0)		Id: 21/27

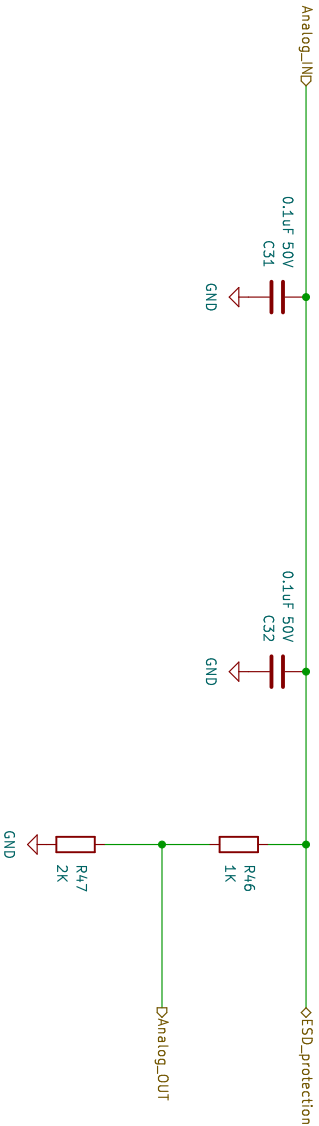


<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-05-14	Rev: 1.2.1
KiCad E.D.A. kicad (7.0.0)		Id: 22/27



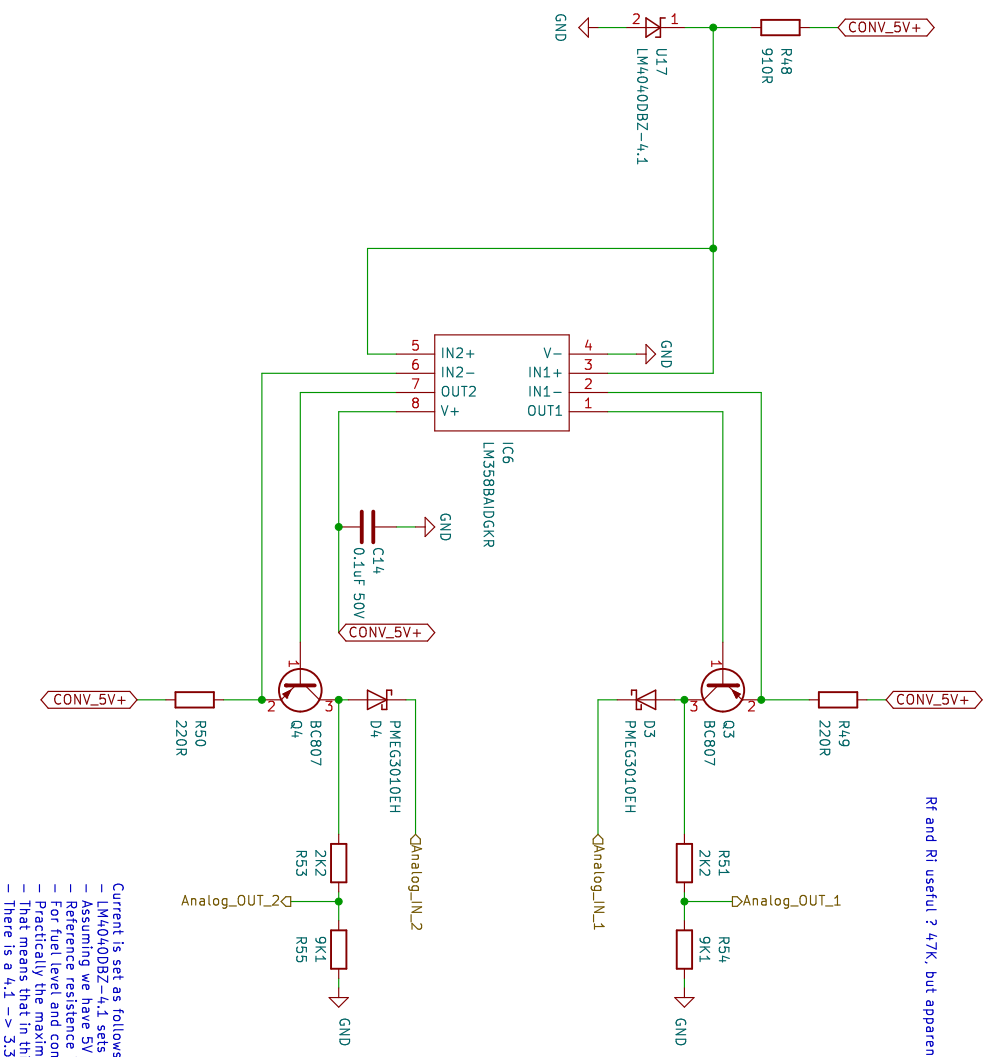
<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-05-14	Rev: 1.2.1
KiCad E.D.A. kicad (7.0.0)		Id: 23/27

- Ideas/issues :
- How to account for variations in the V_f of PMEG3010EH
 - 5V may not be true 5V \rightarrow Zener regulator there too ? evaluate possible swings
 - Design is a bit limited to be usable on $>750\Omega$ m sensors like ECU sensors
 - Something better than PMEG3010EH to use ?



- Current is set as follows :
- LM4040DBZ-4.1 sets voltage at 4.096V on a good day
 - Assuming we have 5V this makes a reference voltage of 0.904V
 - Reference resistance is currently 220R \rightarrow Reference current is $0.904/220 = 4.1mA$ approx
 - For fuel level and common sensors (0–2500hm), that gives a sensor voltage of anywhere between 0 and 1.025V
 - Practically the maximum voltage that can be is 4.096V–0.550V = 3.546 (the scottly typical V_f , although usually lower)
 - That means that in this current setup the practical limit for sensor resistance readout is approximately 800 to 8500hm
 - There is a 4.1 \rightarrow 3.5V divider for the ESP32 ADC using the 2K2 and 9K1 resistors

<https://cadlab.io/projects/vxldash>
<https://github.com/martinroger/VXxDash>

Sheet:	
File: Rsensing_Pair.Kicad_sch	
Title: Dual Op–Amp Constant current source resistive sensor	
Size: A4	Date: 2023–05–14
KiCad E.D.A. kicad (7.0.0)	Rev: 1.2.1
	Id: 24/27

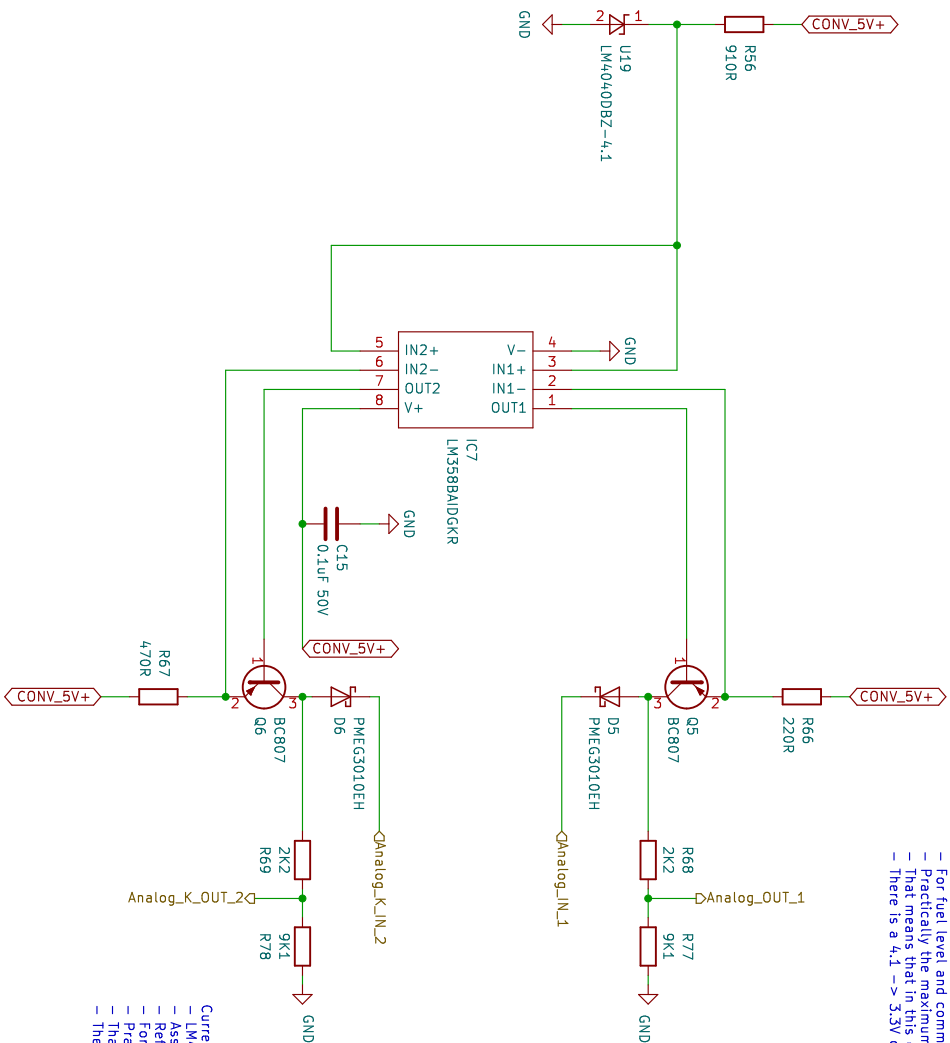
- Ideas/issues :
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Rf and Ri useful ? 47K, but apparently LM358B/BA integrates Rf and Ri

<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

<https://github.com/martinroger/VXDash>

Sheet:

File: R-KRsensing_Pair.kicad_sch

Title: Dual Op-Amp Constant current source resistive sensor

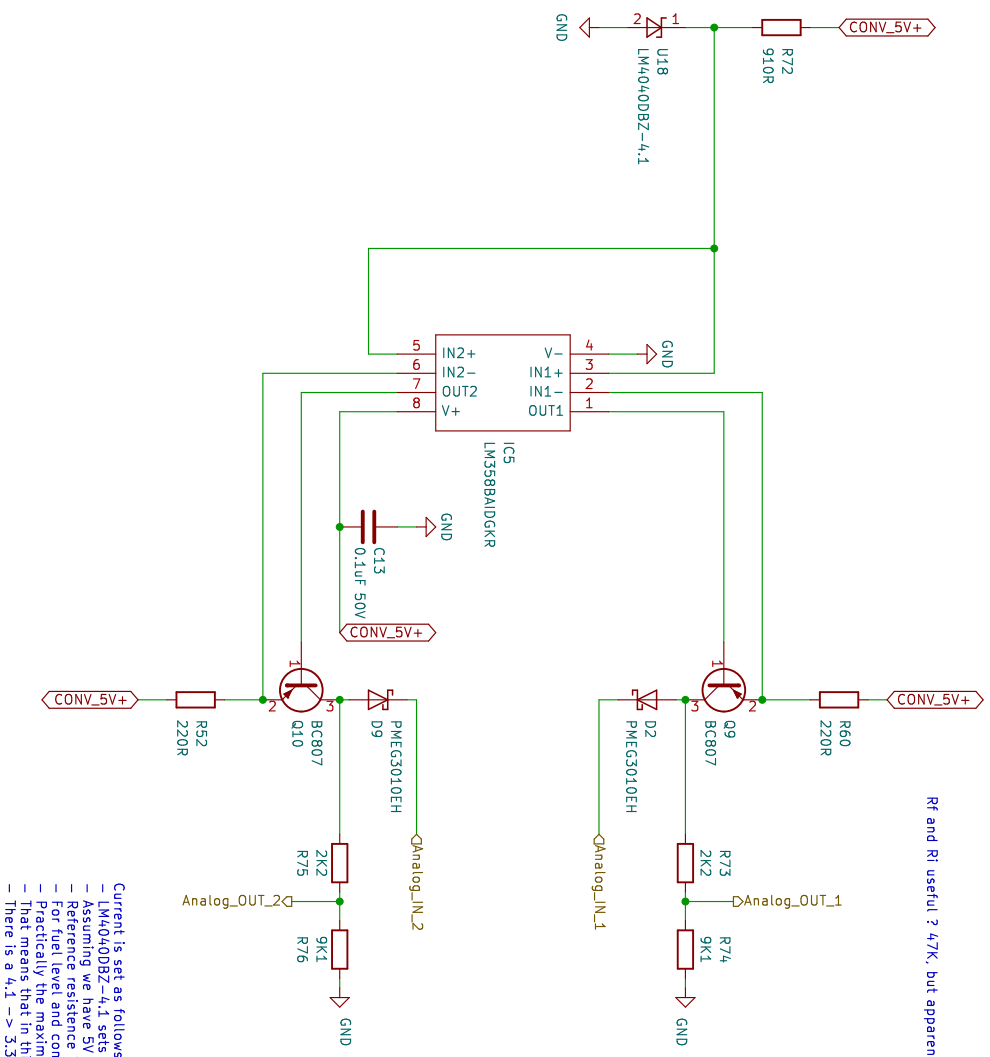
Size: A4	Date: 2023-05-14
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Kicad E.D.A. kicad (7.0.0)

Rev: 1.2.1

Id: 25/27

- Ideas/issues :
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- Practically the maximum voltage that can be is 4.096V–0.550V = 3.546 (the scottly typical V_f , although usually lower)
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- There is a 4.1 \rightarrow 3.5V divider for the ESP32 ADC using the 2K2 and 9K1 resistors

<https://cadlab.io/projects/vxdash>
<https://github.com/martinroger/VXDash>

Sheet:
File: Rsensing_Pair.Kicad.sch

Title: **Dual Op-Amp Constant current source resistive sensor**
Size: A4 Date: 2023-05-14 Rev: 1.2.1
KiCad E.D.A. kicad (7.0.0) Id: 27/27