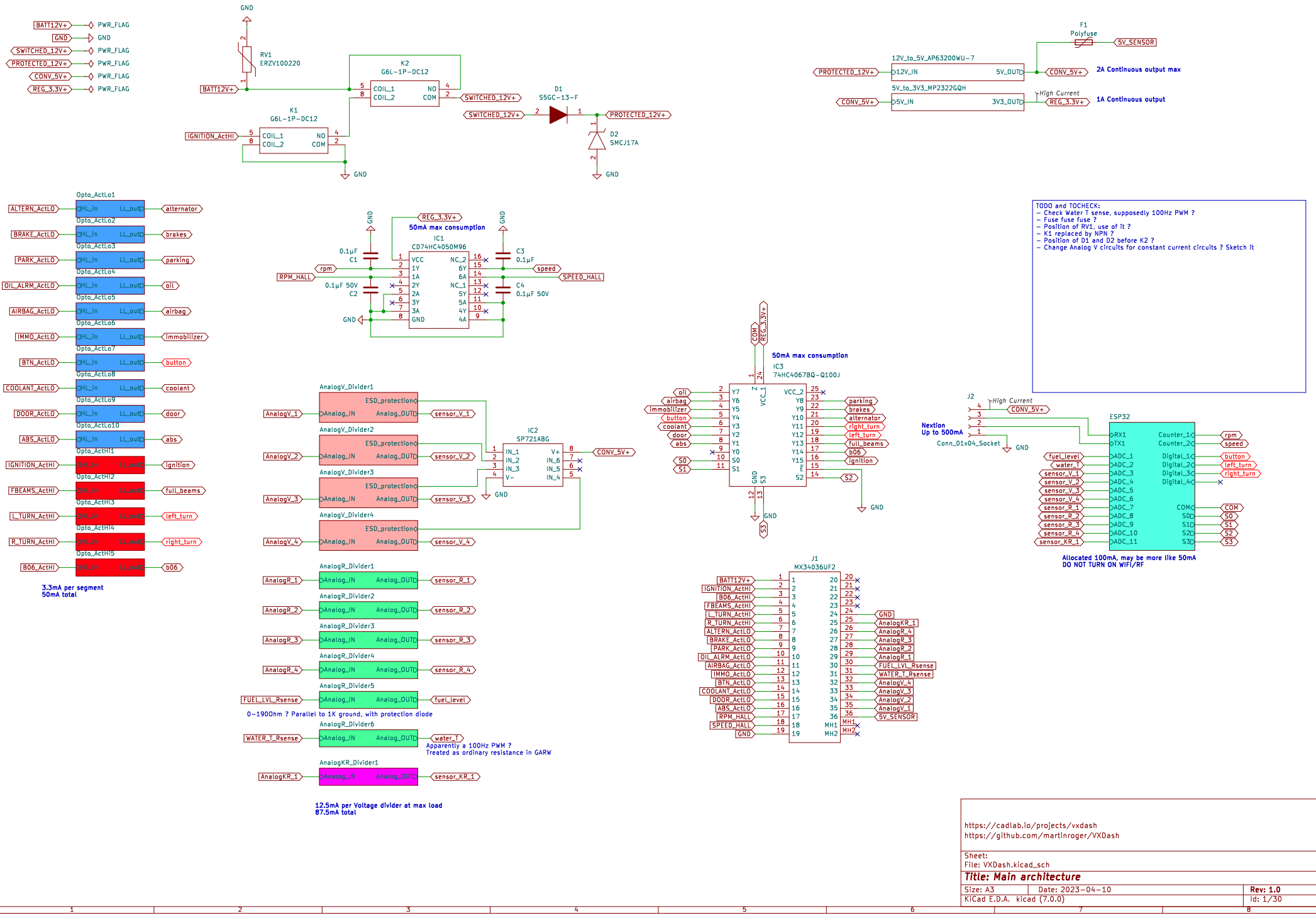
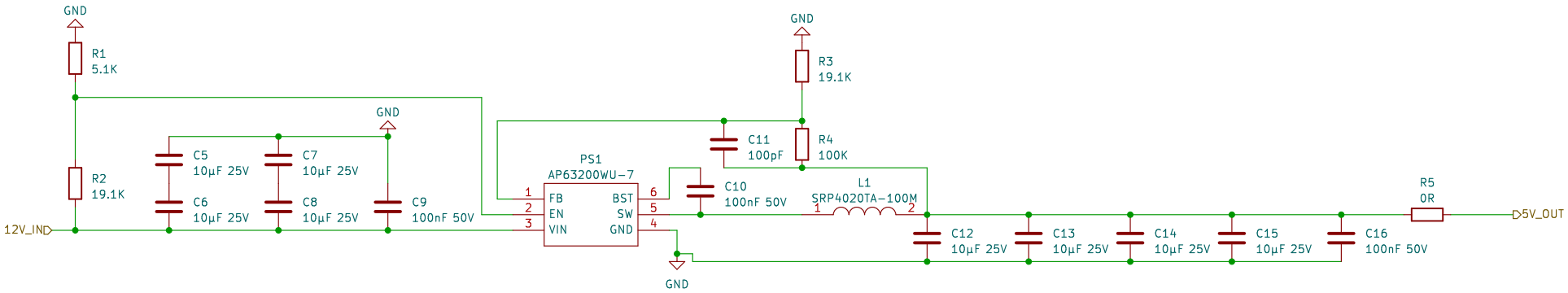

BATT12V+
GND
SWITCHED_12V+
PROTECTED_12V+
CONV_5V+
REG_3.3V+
PWR_FLAG
RV1
ERZV10D220
K2
G6L-1P-DC12
COIL_1
COIL_2
NO
COM
K1
IGNITION_ActHI
SWITCHED_12V+
D1
S5GC-13-F
D2
SMCJ17A
PROTECTED_12V+
F1
Polyfuse
5V_SENSOR
12V_to_5V_AP63200WU-7
12V_IN
5V_OUT
2A Continuous output max
5V_to_3V3_MP2322GQH
5V_IN
3V3_OUT
High Current
1A Continuous output
REG_3.3V+
50mA max consumption
IC1
CD74HC4050M96
0.1µF
C1
C2
C3
C4
0.1µF 50V
rpm
speed
RPM_HALL
SPEED_HALL
Opto_ActLo1
ALTERN_ActLO
alternator
Opto_ActLo2
BRAKE_ActLO
brakes
Opto_ActLo3
PARK_ActLO
parking
Opto_ActLo4
OIL_ALRM_ActLO
oil
Opto_ActLo5
AIRBAG_ActLO
airbag
Opto_ActLo6
IMMO_ActLO
immobilizer
Opto_ActLo7
BTN_ActLO
button
Opto_ActLo8
COOLANT_ActLO
coolant
Opto_ActLo9
DOOR_ActLO
door
Opto_ActLo10
ABS_ActLO
abs
Opto_ActHI1
IGNITION_ActHI
ignition
Opto_ActHI2
FBEAMS_ActHI
full_beams
Opto_ActHI3
L_TURN_ActHI
left_turn
Opto_ActHI4
R_TURN_ActHI
right_turn
Opto_ActHI5
B06_ActHI
b06
3.3mA per segment
50mA total
TODO and TOCHECK:
- Check Water T sense, supposedly 100Hz PWM ?
- Fuse fuse fuse ?
- Position of RV1, use of it ?
- K1 replaced by NPN ?
- Position of D1 and D2 before K2 ?
- Change Analog V circuits for constant current circuits ? Sketch it
IC3
74HC4067BQ-Q100J
COM
50mA max consumption
oil
airbag
immobilizer
button
coolant
door
abs
S0
S1
S2
S3
J2
Nextion
Up to 500mA
Conn_01x04_Socket
ESP32
fuel_level
water_T
sensor_V_1
sensor_V_2
sensor_V_3
sensor_V_4
sensor_R_1
sensor_R_2
sensor_R_3
sensor_R_4
sensor_KR_1
Allocated 100mA, may be more like 50mA
DO NOT TURN ON WIFI/RF
AnalogV_Divider1
AnalogV_Divider2
AnalogV_Divider3
AnalogV_Divider4
ESD_protection
Analog_IN
Analog_OUT
AnalogV_1
AnalogV_2
AnalogV_3
AnalogV_4
sensor_V_1
sensor_V_2
sensor_V_3
sensor_V_4
IC2
SP721ABG
AnalogR_Divider1
AnalogR_Divider2
AnalogR_Divider3
AnalogR_Divider4
AnalogR_Divider5
AnalogR_Divider6
AnalogR_1
AnalogR_2
AnalogR_3
AnalogR_4
sensor_R_1
sensor_R_2
sensor_R_3
sensor_R_4
FUEL_LVL_Rsense
fuel_level
0-190Ohm ? Parallel to 1K ground, with protection diode
WATER_T_Rsense
water_T
Apparently a 100Hz PWM ?
Treated as ordinary resistance in GARW
AnalogKR_Divider1
AnalogKR_1
sensor_KR_1
12.5mA per Voltage divider at max load
87.5mA total
J1
MX34036UF2
BATT12V+
IGNITION_ActHI
B06_ActHI
FBEAMS_ActHI
L_TURN_ActHI
R_TURN_ActHI
ALTERN_ActLO
BRAKE_ActLO
PARK_ActLO
OIL_ALRM_ActLO
AIRBAG_ActLO
IMMO_ActLO
BTN_ActLO
COOLANT_ActLO
DOOR_ActLO
ABS_ActLO
RPM_HALL
SPEED_HALL
FUEL_LVL_Rsense
WATER_T_Rsense
AnalogV_4
AnalogV_3
AnalogV_2
AnalogV_1
5V_SENSOR
MH1
MH2
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash
Sheet:
File: VXDash.kicad_sch
Title: Main architecture
Size: A3
Date: 2023-04-10
Rev: 1.0
KiCad E.D.A. kicad (7.0.0)
Id: 1/30



MAX 2A CONTINUOUS OUTPUT

All resistors low tolerance
All capacitors low ESR

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

Sheet:
File: 12V_to_5V_AP63200WU-7.kicad_sch

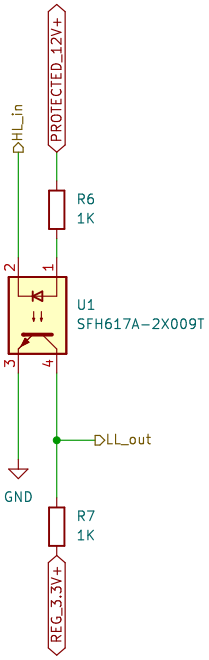
Title: 12V to 5V conversion

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 2/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

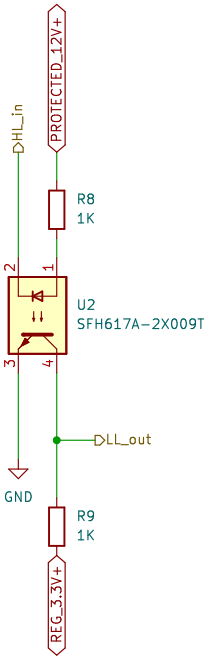
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 3/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

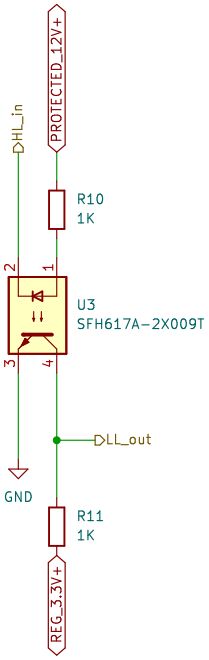
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 4/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

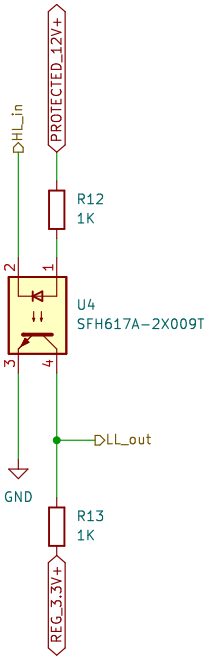
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 5/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

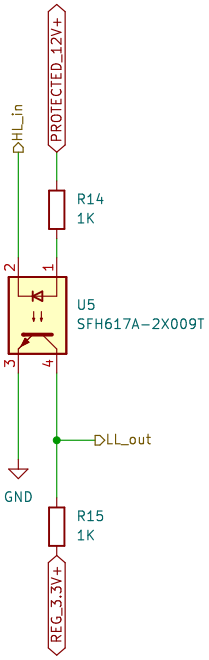
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 6/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

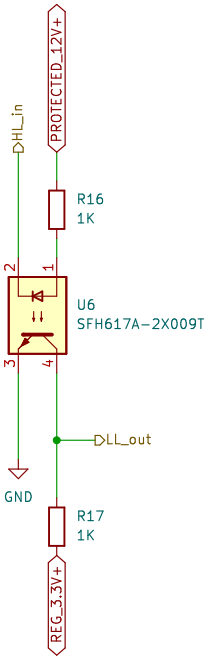
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 7/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

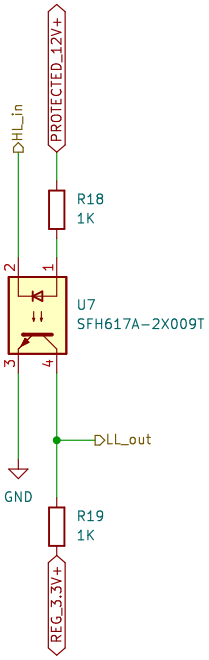
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 8/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

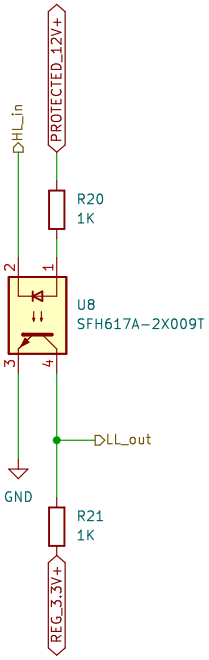
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 9/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

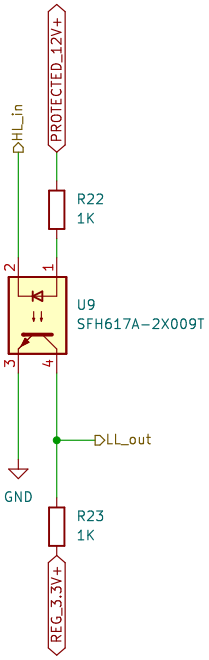
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 10/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

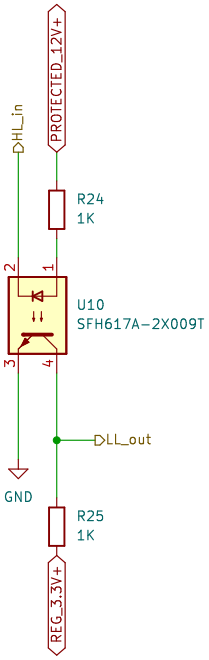
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 11/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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

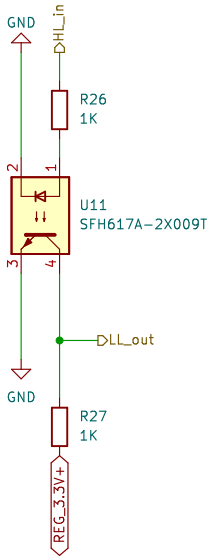
Title: Active Low Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 12/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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_ActHi.kicad_sch

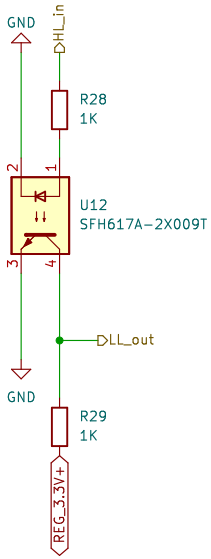
Title: Active Hi Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 13/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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_ActHi.kicad_sch

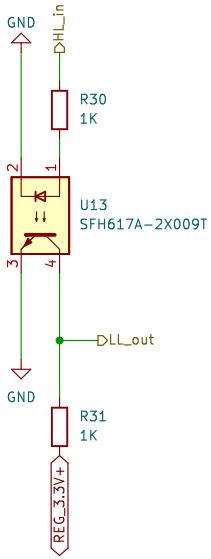
Title: Active Hi Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 14/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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_ActHi.kicad_sch

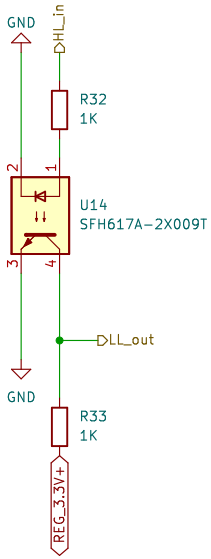
Title: Active Hi Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 15/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 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_ActHi.kicad_sch

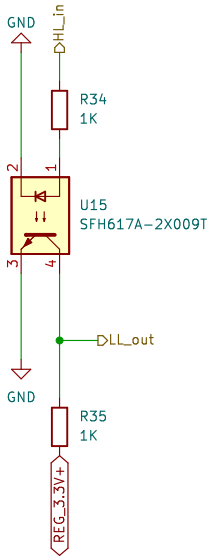
Title: Active Hi Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 16/30

SFH617A-2X009T
CTR 63-125%
Vf = 1.35V

Circuit CTR:
If = (12V-1.35V)/1K = 10.65mA
Ic = 3.3/1K = 3.3mA
CTRc = 3.3/10.65 = 30.9%

Opto is always in saturation

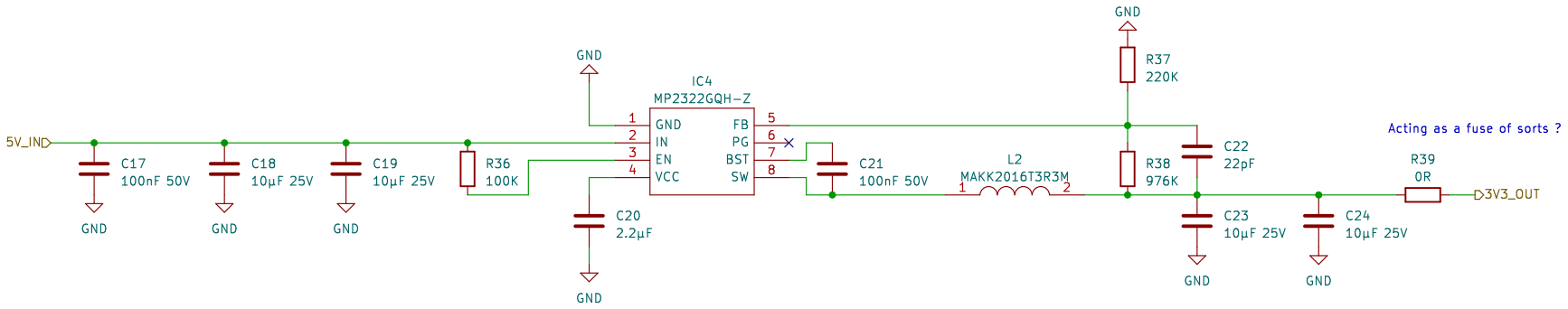


https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: Opto_ActHi.kicad_sch

Title: Active Hi Optocoupler circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 17/30

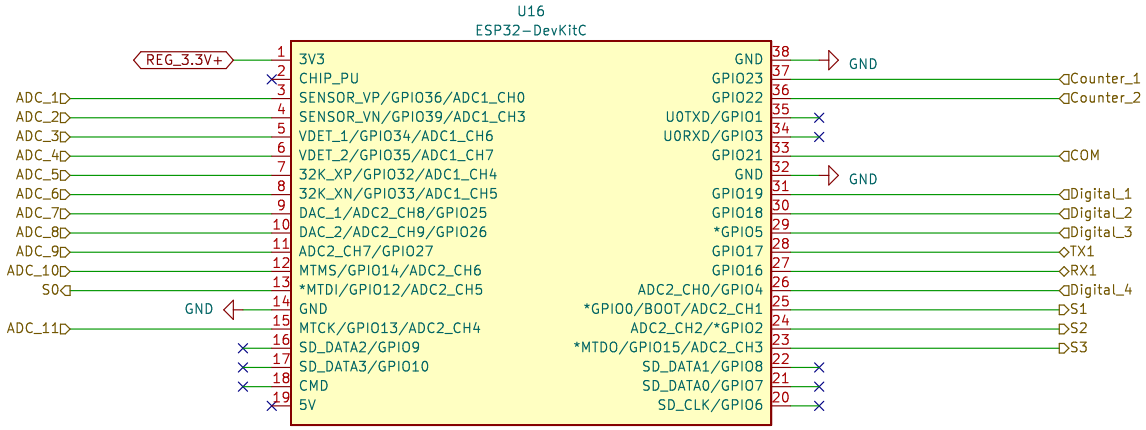


https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: 5V_to_3V3_MP2322GQH.kicad_sch

Title: 5 to 3V3 stage

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 18/30

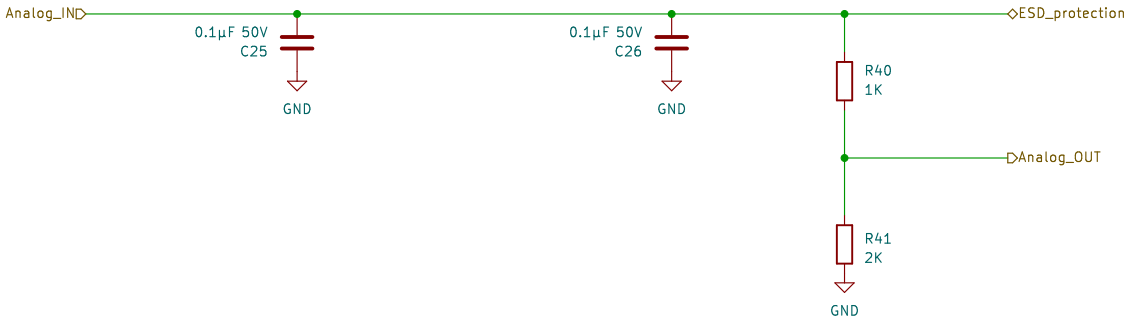


https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: ESP32.kicad_sch

Title: ESP32 container

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 19/30

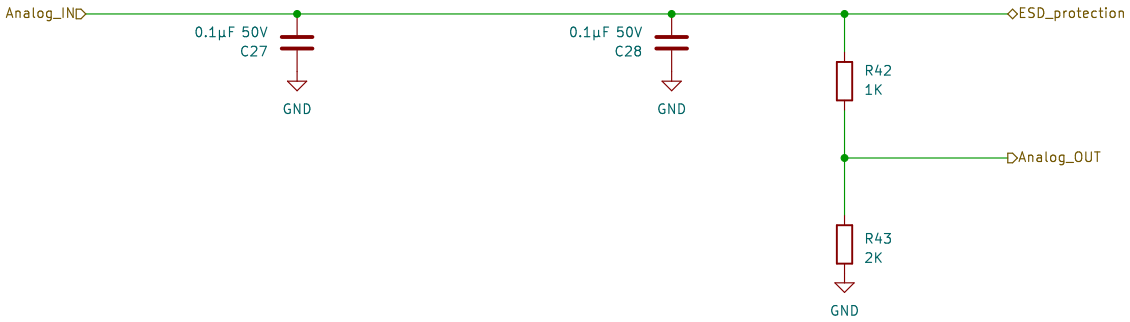


https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 20/30

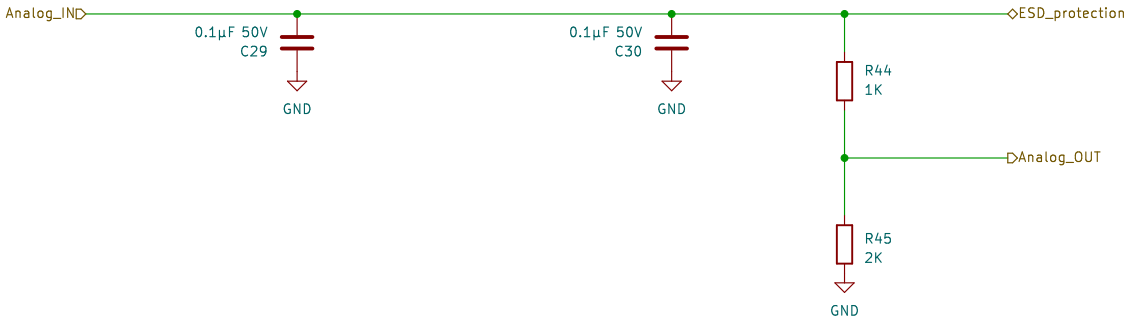


https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 21/30

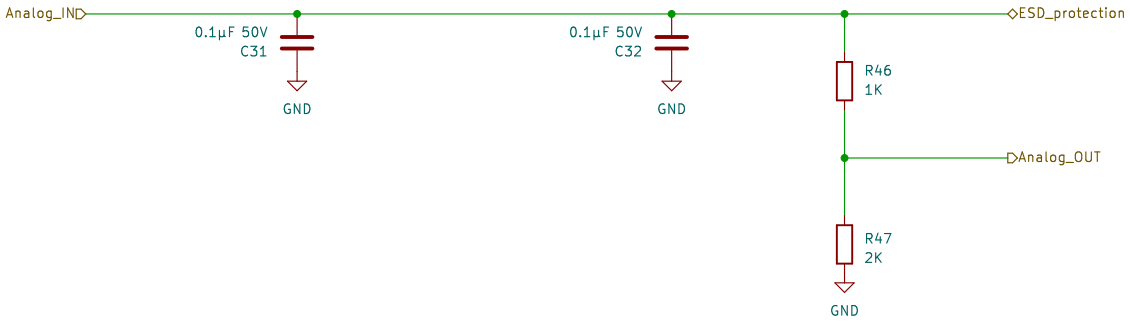


https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 22/30



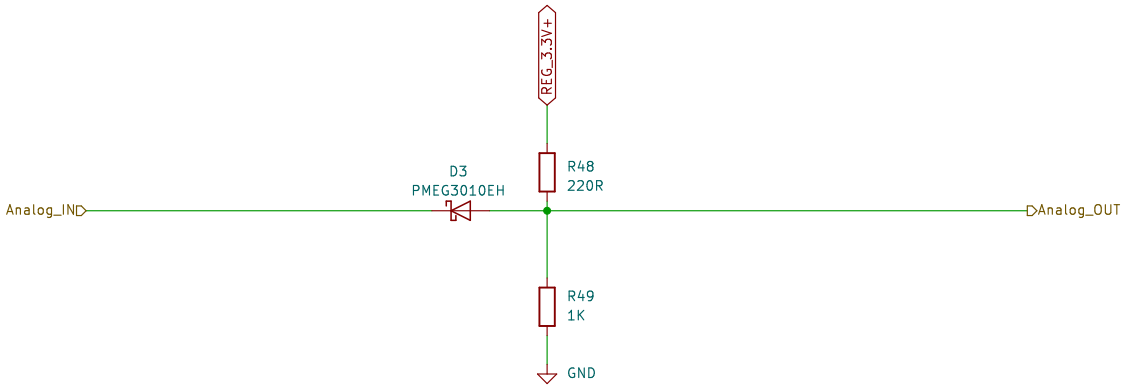
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogV_Divider.kicad_sch

Title: 0-5V voltage sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 23/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?
220Ohm could be replaced by PPTC 30mA ?



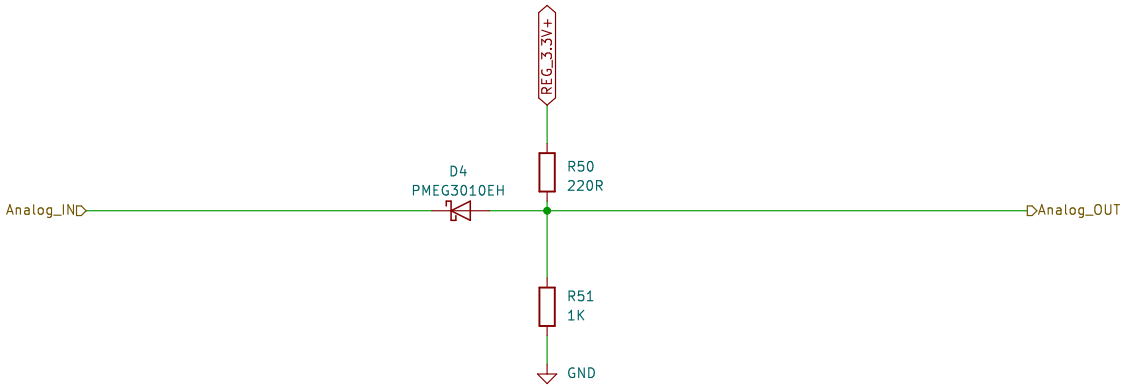
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogR_Divider.kicad_sch

Title: Low R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 24/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?
220Ohm could be replaced by PPTC 30mA ?



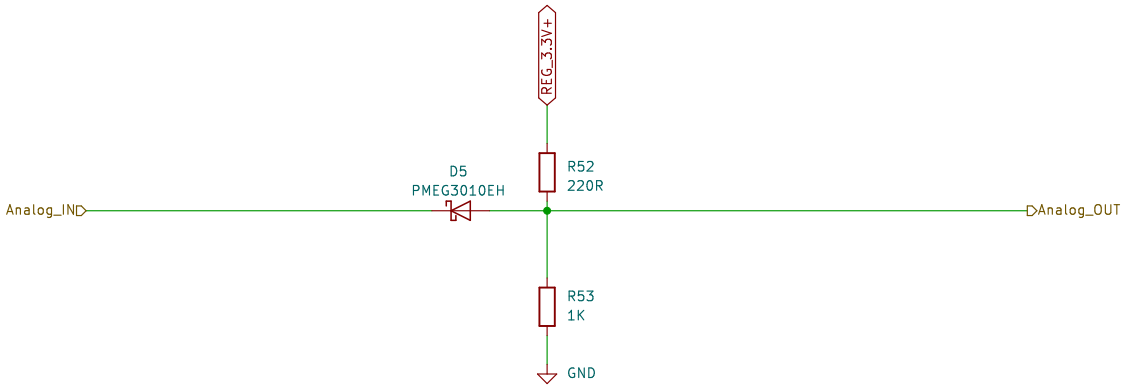
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogR_Divider.kicad_sch

Title: Low R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 25/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?
220Ohm could be replaced by PPTC 30mA ?



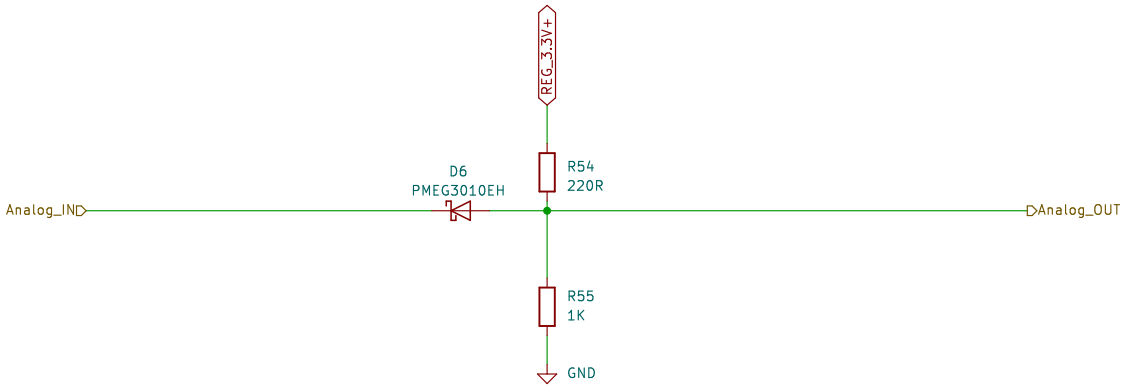
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogR_Divider.kicad_sch

Title: Low R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 26/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?
220Ohm could be replaced by PPTC 30mA ?



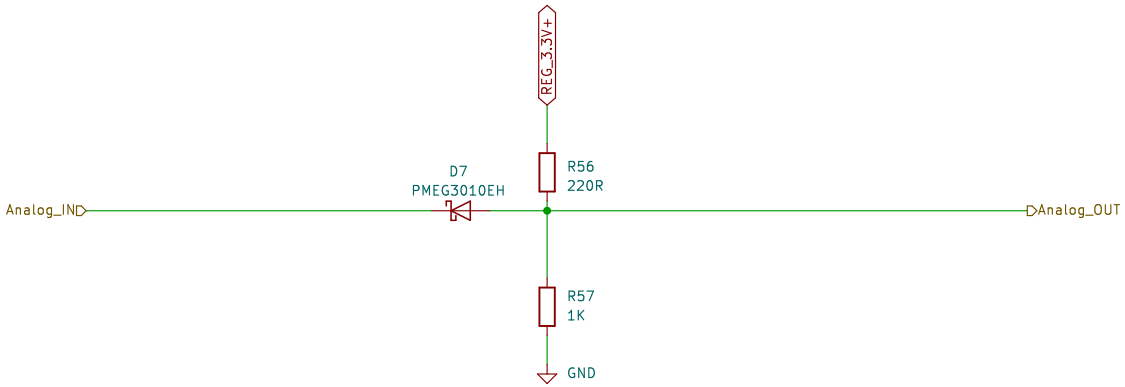
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogR_Divider.kicad_sch

Title: Low R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 27/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?
220Ohm could be replaced by PPTC 30mA ?



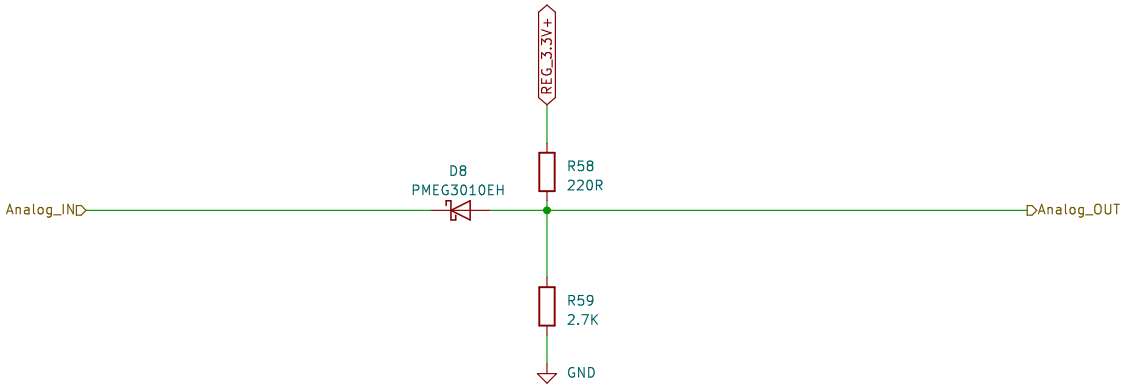
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogR_Divider.kicad_sch

Title: Low R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 28/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?



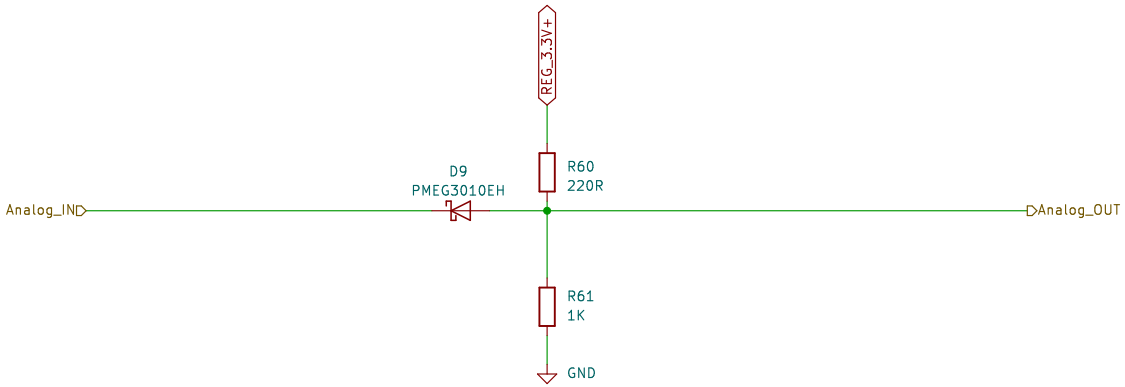
https://cadlab.io/projects/vxdash
https://github.com/martinroger/VXDash

Sheet:
File: AnalogR_Divider_HiR.kicad_sch

Title: High R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 29/30

0.55 forward voltage diode for Spikes and backfeeding protection including short to +12V
Clamping ?
1K resistor in parallel -> increase for ECU sensor types ?
220Ohm could be replaced by PPTC 30mA ?



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

Sheet:
File: AnalogR_Divider.kicad_sch

Title: Low R sensing circuit

Size: A4	Date: 2023-04-10	**Rev: 1.0**
KiCad E.D.A. kicad (7.0.0)		Id: 30/30