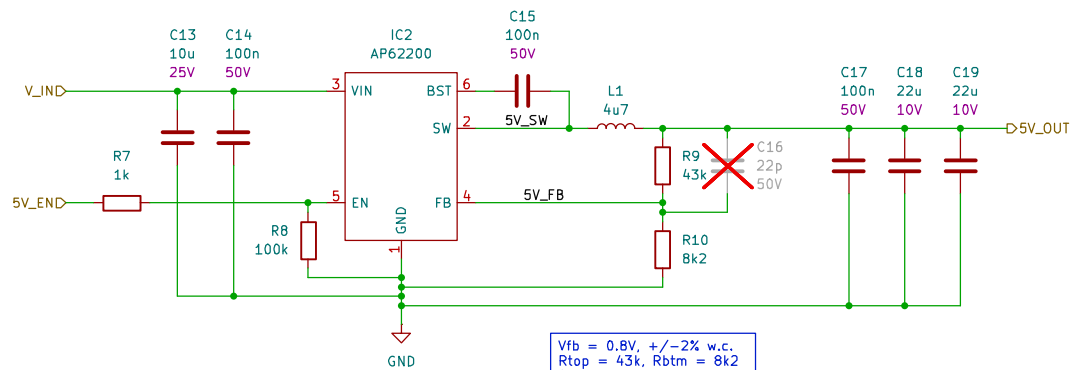


[illegible][illegible][illegible][illegible][illegible][illegible]

https://github.com/martnroger/VXDash
 Alex Miller & Martin Roger
 Sheet: /
 File: VXDash.kicad_sch
 Title: *Main architecture*

Size: A2	Date: 2025-10-27	Rev: 2.0-prot
KiCad E.D.A. 9.0.0		Id: 1/38



Vfb = 0.8V, +/-2% w.c.
 Rtop = 43k, Rbtm = 8k2
 4.995V out typ. min
 -4.86V, max -5.12V

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

Alex Miller & Martin Roger

Sheet: /5V_SMPS/

File: 5V_SMPS.kicad_sch

Title: 5V SMPS

Size: A4

Date: 2025-10-27

Rev: 2.0

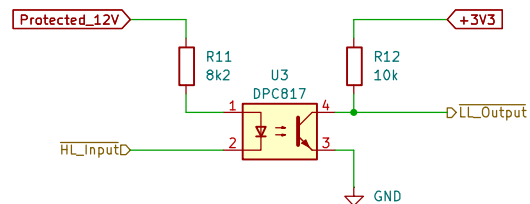
KiCad E.D.A. 9.0.0

Id: 2/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo1/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

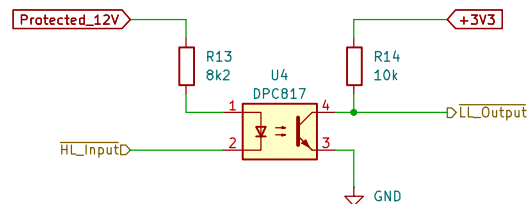
KiCad E.D.A. 9.0.0

Id: 3/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo2/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

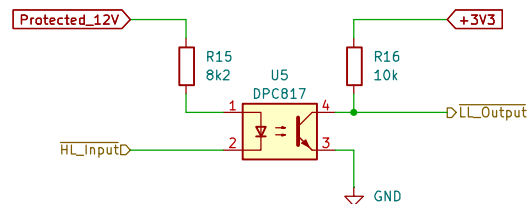
KiCad E.D.A. 9.0.0

Id: 4/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo3/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

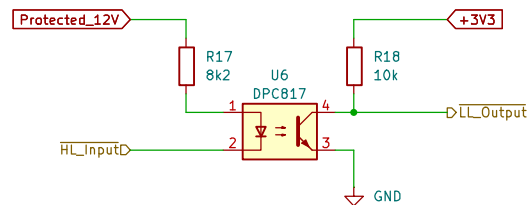
KiCad E.D.A. 9.0.0

Id: 5/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo4/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

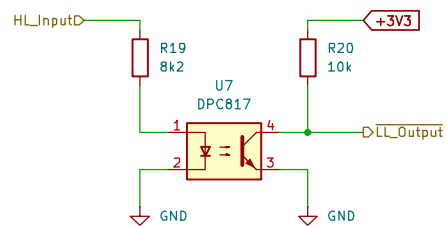
KiCad E.D.A. 9.0.0

Id: 6/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

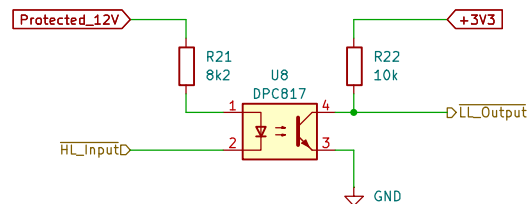
<https://github.com/martinroger/VXDash>
Alex Miller & Martin Roger
Sheet: /Opto_ActHi9/
File: Opto_ActHi.kicad_sch

Title: Optoisolator Active High Follower

Size: A4	Date: 2025-10-27	Rev: 2.0
KiCad E.D.A. 9.0.0		Id: 7/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$
Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo6/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

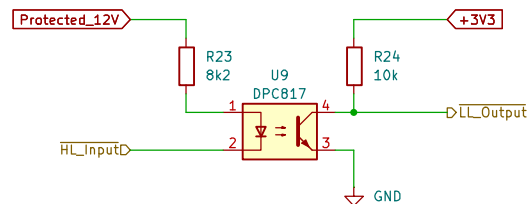
Rev: 2.0

KiCad E.D.A. 9.0.0

Id: 8/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$
Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo7/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

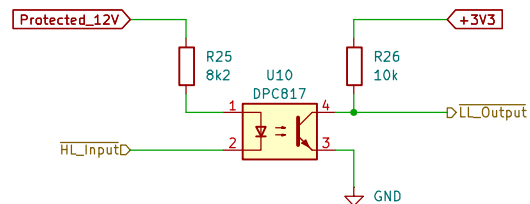
KiCad E.D.A. 9.0.0

Id: 9/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo8/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

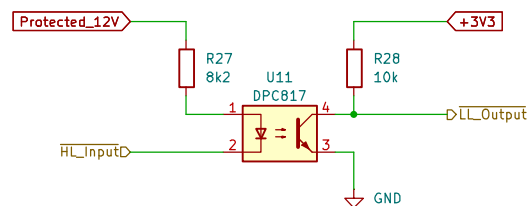
KiCad E.D.A. 9.0.0

Id: 10/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo9/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

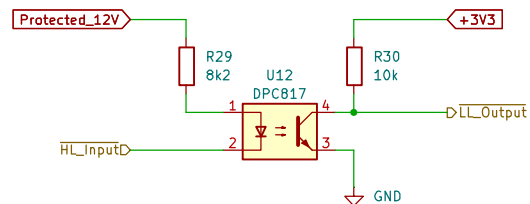
KiCad E.D.A. 9.0.0

Id: 11/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$.
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActLo10/

File: Opto_ActLo.kicad_sch

Title: Optoisolator Active Low Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

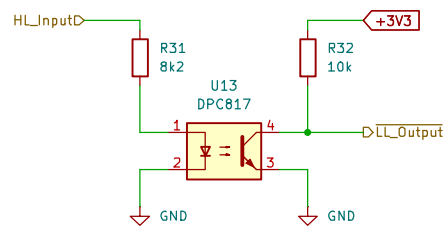
KiCad E.D.A. 9.0.0

Id: 12/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActHi5/

File: Opto_ActHi.kicad_sch

Title: Optoisolator Active High Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

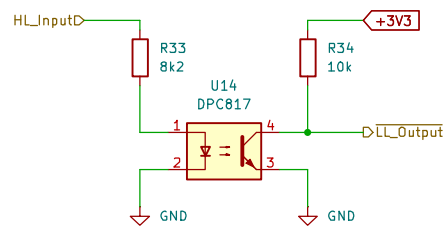
KiCad E.D.A. 9.0.0

Id: 13/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActHi6/

File: Opto_ActHi.kicad_sch

Title: Optoisolator Active High Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

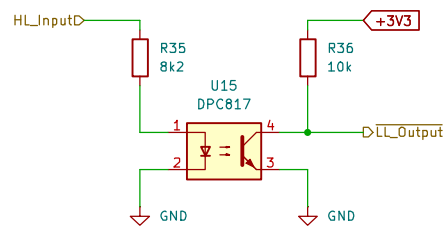
KiCad E.D.A. 9.0.0

Id: 14/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActHi7/

File: Opto_ActHi.kicad_sch

Title: Optoisolator Active High Follower

Size: A4

Date: 2025-10-27

Rev: 2.0

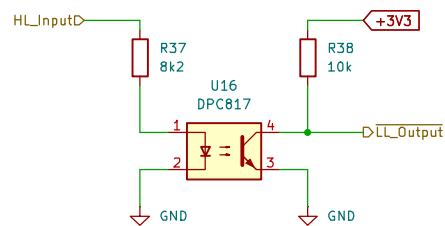
KiCad E.D.A. 9.0.0

Id: 15/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

<https://github.com/martinroger/VXDash>
Alex Miller & Martin Roger
Sheet: /Opto_ActHi4/
File: Opto_ActHi.kicad_sch

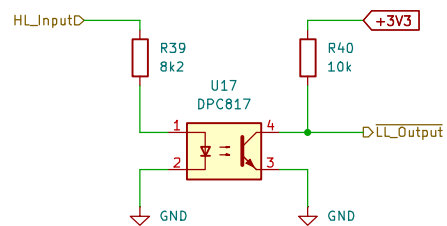
Title: Optoisolator Active High Follower

Size: A4	Date: 2025-10-27	Rev: 2.0
KiCad E.D.A. 9.0.0		Id: 16/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation

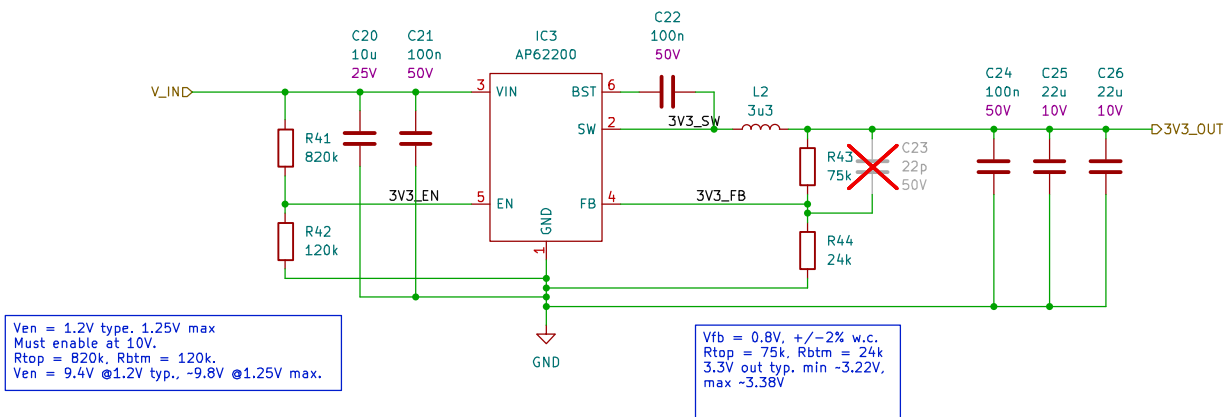


Single channel alternative : LiteOn LTV-8175

<https://github.com/martinroger/VXDash>
Alex Miller & Martin Roger
Sheet: /Opto_ActHi8/
File: Opto_ActHi.kicad_sch

Title: Optoisolator Active High Follower

Size: A4	Date: 2025-10-27	Rev: 2.0
KiCad E.D.A. 9.0.0		Id: 17/38



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

Alex Miller & Martin Roger

Sheet: /3V3_SMPS/

File: 3V3_SMPS.kicad_sch

Title: 3V3 SMPS

Size: A4

Date: 2025-10-27

Rev: 2.0

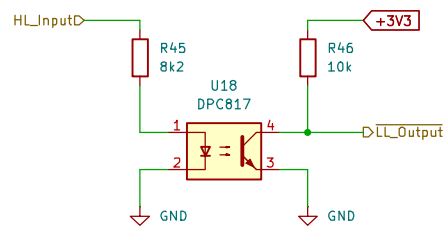
KiCad E.D.A. 9.0.0

Id: 18/38

Assume 50% CTR w.c.
Vf = 1.2V @1mA
Lowest battery = 10V

Circuit CTR:
 $I_f = (10V - 1.2V) / 1mA = 8.8k$
Lower closest 8k2 = 1.07mA
 $I_c = 3.3 / 10k = 330uA$
 $CTR_c = 0.33 / 1.07 = 30.8\%$

Opto is always in saturation



Single channel alternative : LiteOn LTV-8175

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

Alex Miller & Martin Roger

Sheet: /Opto_ActHi10/

File: Opto_ActHi.kicad_sch

Title: Optoisolator Active High Follower

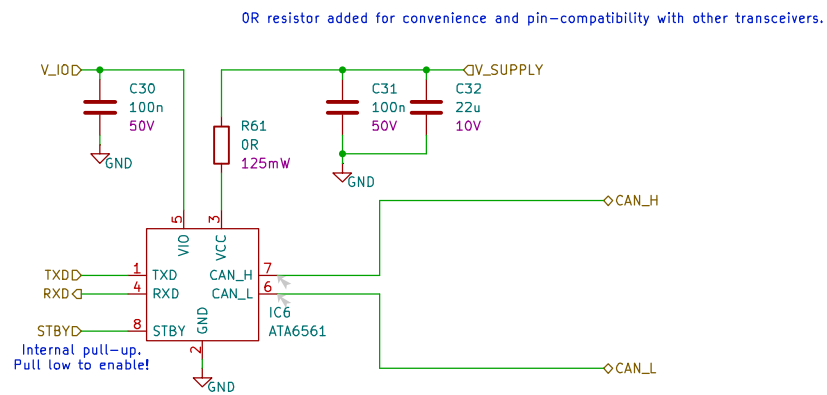
Size: A4

Date: 2025-10-27

Rev: 2.0

KiCad E.D.A. 9.0.0

Id: 19/38



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

Alex Miller & Martin Roger

Sheet: /Left Display CAN XCVR/

File: can_xcvr.kicad_sch

Title: Main architecture

Size: A4

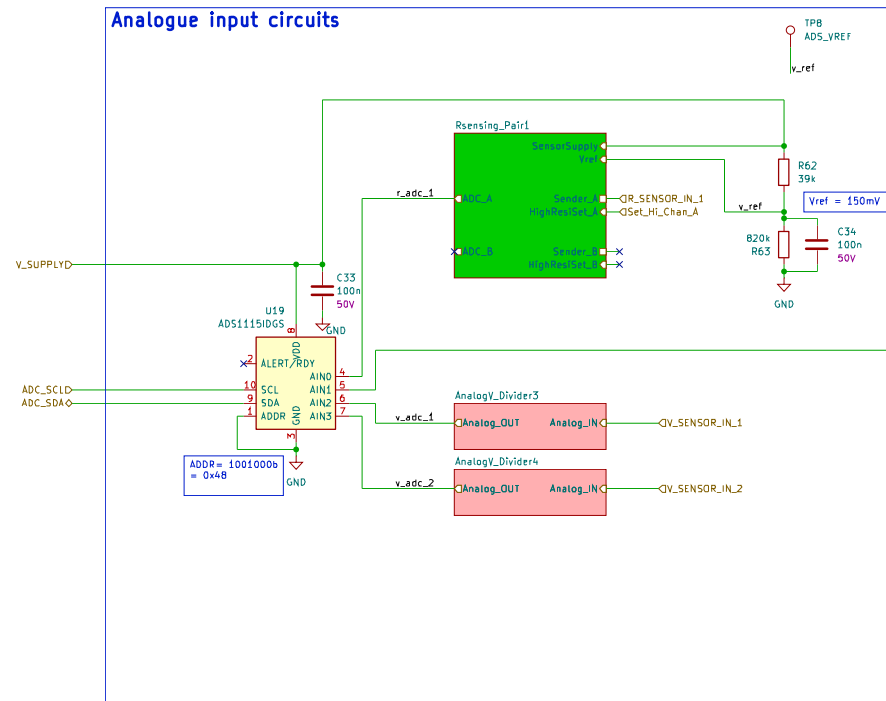
Date: 2025-10-27

Rev: 1.5

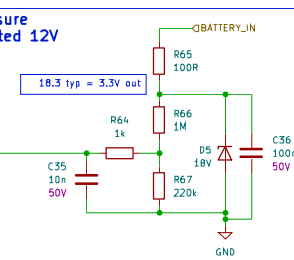
KiCad E.D.A. 9.0.0

Id: 21/38

Analogue input circuits



Battery Measure From protected 12V



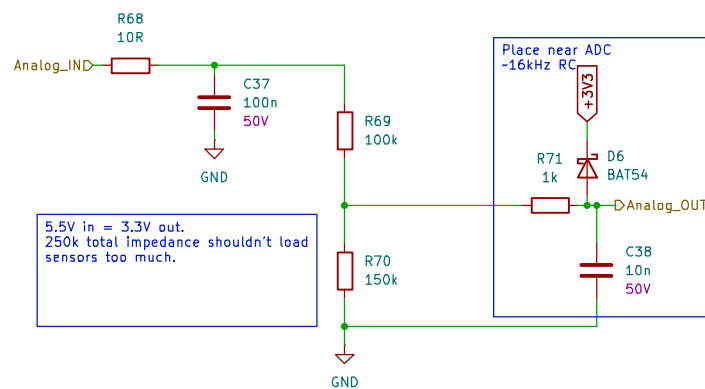
<https://github.com/martinroger/VXDash>
 Alex Miller & Martin Roger

Sheet: /ANALOGUE/
 File: Analogue.kicad_sch

Title: Analog circuit

Size: A3 | Date: 2025-10-27
 KiCad E.D.A. 9.0.0

Rev: 1.5
 Id: 22/38



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

Alex Miller & Martin Roger

Sheet: /ANALOGUE/AnalogV_Divider3/

File: AnalogV_Divider.kicad_sch

Title: Analog V divider

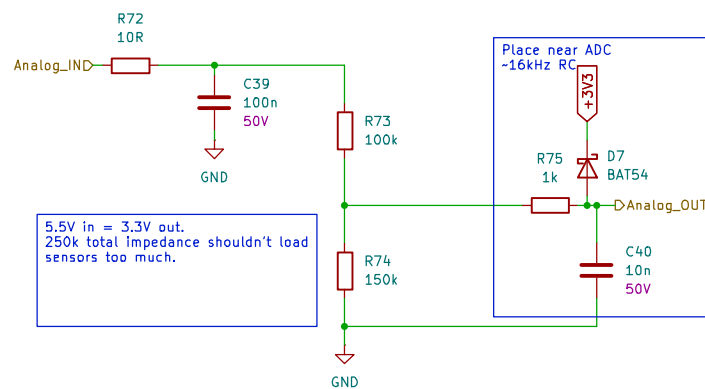
Size: A4

Date: 2025-10-27

Rev: 1.1

KiCad E.D.A. 9.0.0

Id: 23/38



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

Alex Miller & Martin Roger

Sheet: /ANALOGUE/AnalogV_Divider4/

File: AnalogV_Divider.kicad_sch

Title: Analog V divider

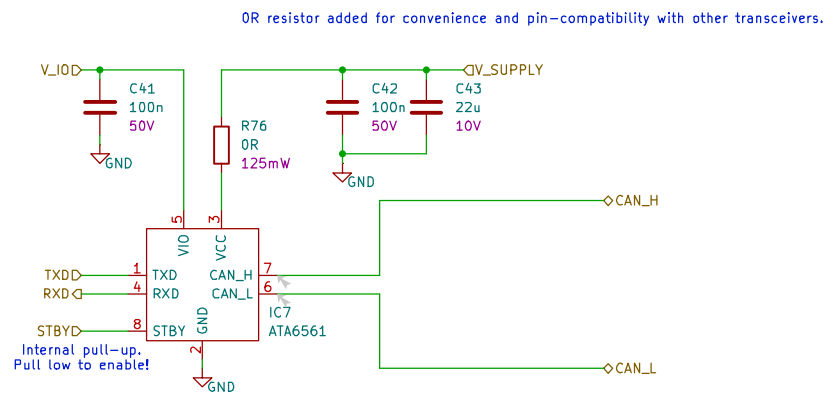
Size: A4

Date: 2025-10-27

Rev: 1.1

KiCad E.D.A. 9.0.0

Id: 24/38



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

Alex Miller & Martin Roger

Sheet: /Right Display CAN XCVR/

File: can_xcvr.kicad_sch

Title: Main architecture

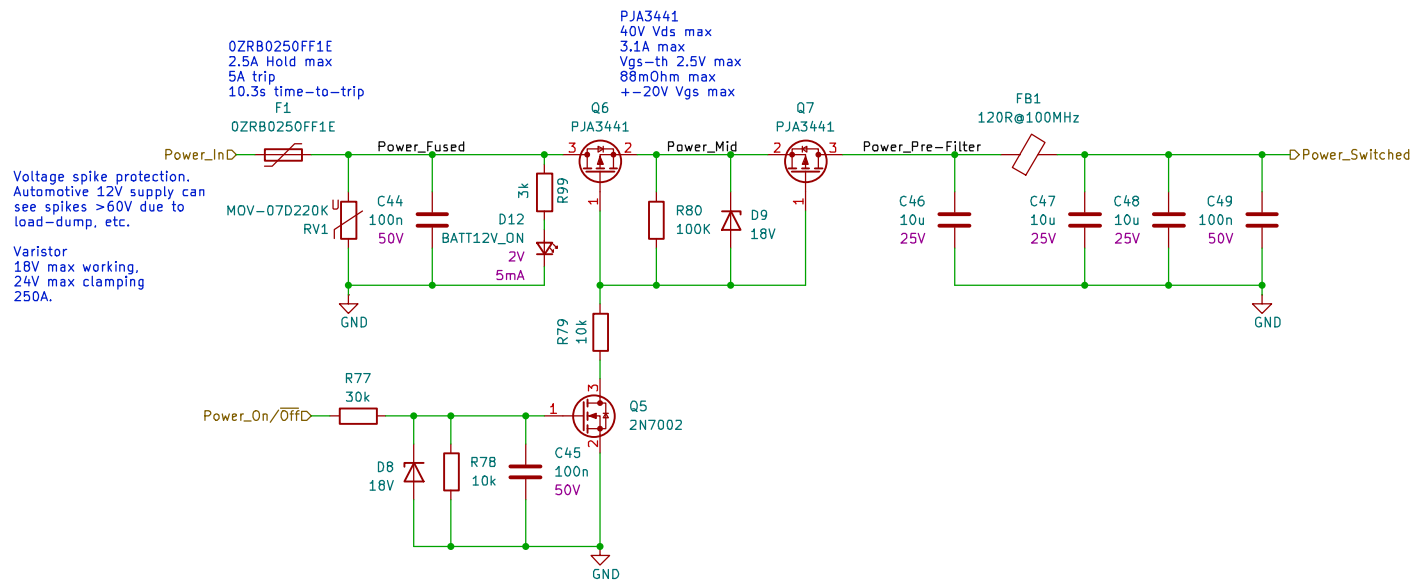
Size: A4

Date: 2025-10-27

Rev: 1.5

KiCad E.D.A. 9.0.0

Id: 25/38



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

Alex Miller & Martin Roger

Sheet: /POWER INPUT/

File: Power_Input.kicad_sch

Title: Ignition and power protection

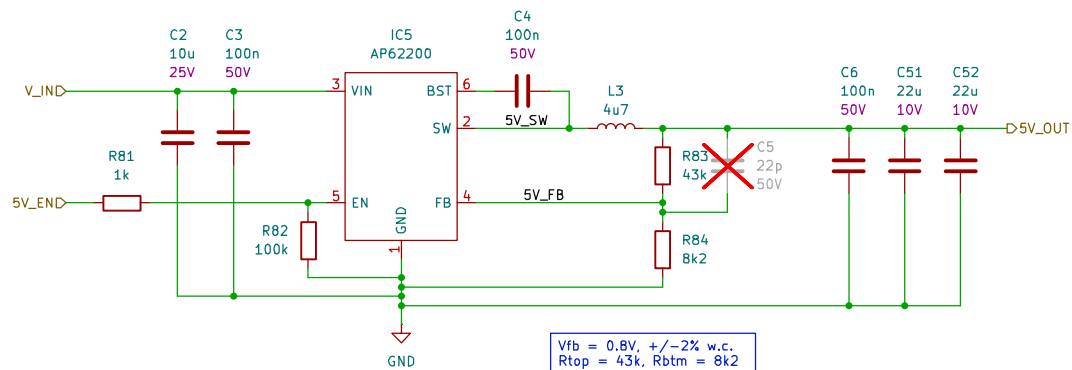
Size: A4

Date: 2025-10-27

Rev: 2.0

KiCad E.D.A. 9.0.0

Id: 26/38



Vfb = 0.8V, +/-2% w.c.
 Rtop = 43k, Rbtm = 8k2
 4.995V out typ. min
 -4.86V, max -5.12V

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

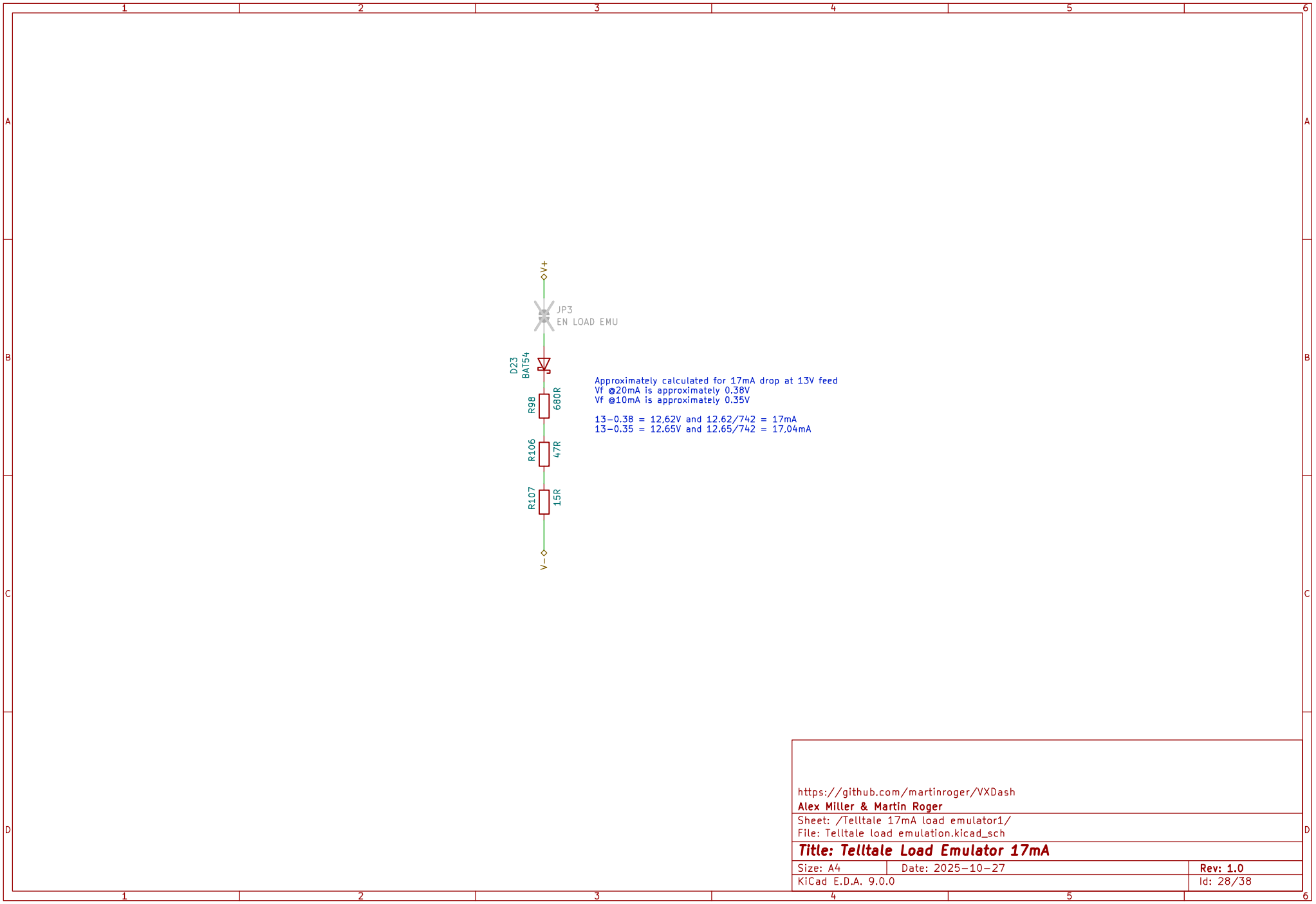
Alex Miller & Martin Roger

Sheet: /5V_SMPS_AUX/

File: 5V_SMPS.kicad_sch

Title: 5V SMPS

Size: A4	Date: 2025-10-27	Rev: 2.0
KiCad E.D.A. 9.0.0		Id: 27/38



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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator1/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

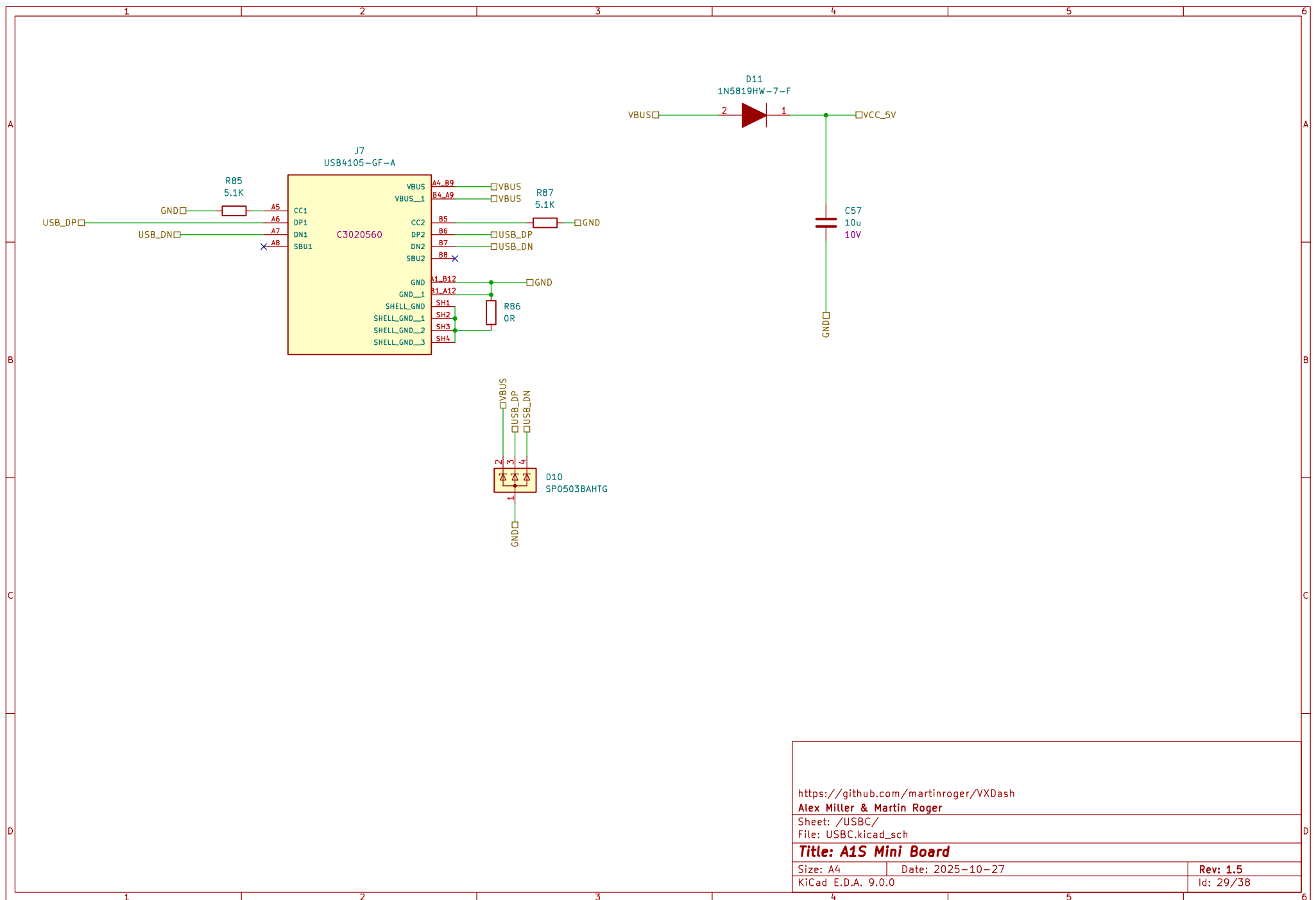
Size: A4

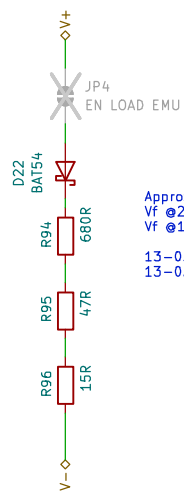
Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 28/38





Approximately calculated for 17mA drop at 13V feed
Vf @20mA is approximately 0.38V
Vf @10mA is approximately 0.35V
 $13 - 0.38 = 12.62\text{V}$ and $12.62 / 742 = 17\text{mA}$
 $13 - 0.35 = 12.65\text{V}$ and $12.65 / 742 = 17.04\text{mA}$

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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

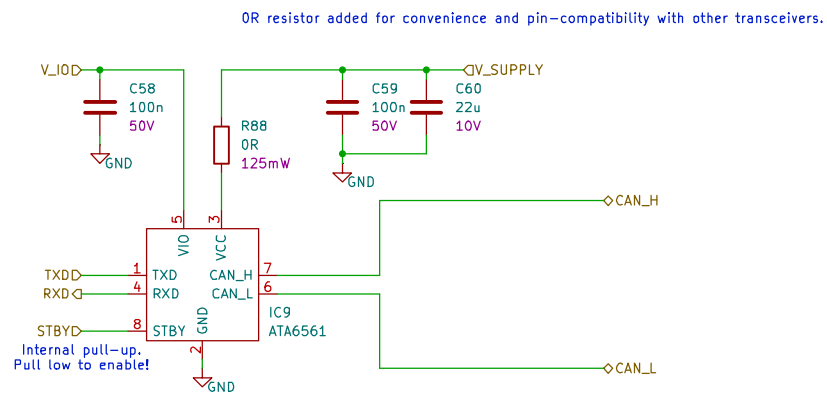
Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 30/38



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

Alex Miller & Martin Roger

Sheet: /IB CAN XCVR/

File: can_xcvr.kicad_sch

Title: Main architecture

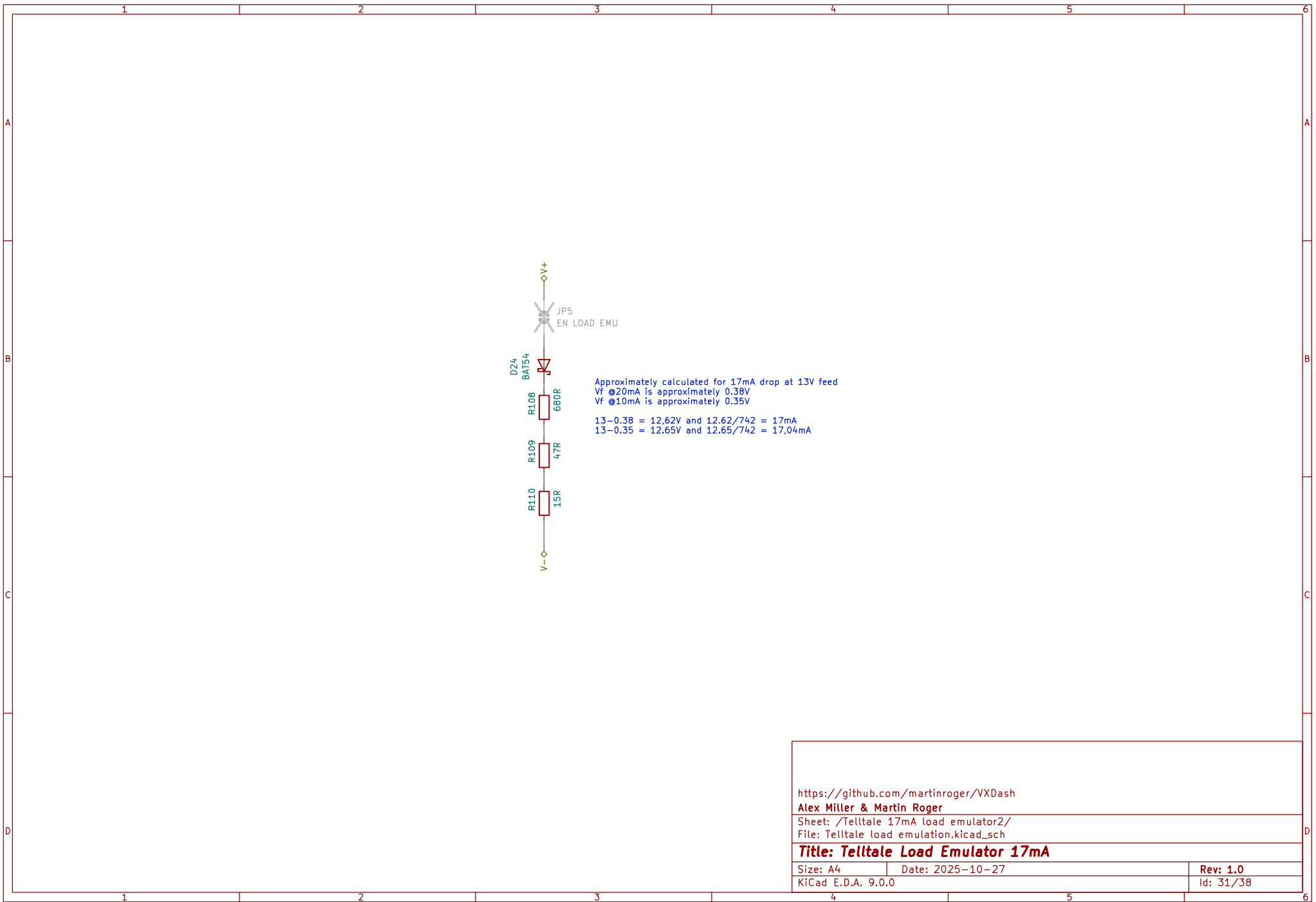
Size: A4

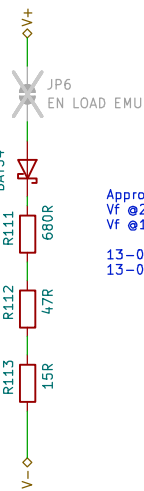
Date: 2025-10-27

Rev: 1.5

KiCad E.D.A. 9.0.0

Id: 30/38





Approximately calculated for 17mA drop at 13V feed
Vf @20mA is approximately 0.38V
Vf @10mA is approximately 0.35V
 $13 - 0.38 = 12.62\text{V}$ and $12.62 / 742 = 17\text{mA}$
 $13 - 0.35 = 12.65\text{V}$ and $12.65 / 742 = 17.04\text{mA}$

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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator3/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

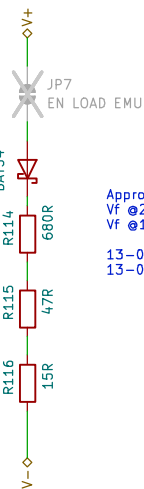
Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 32/38



Approximately calculated for 17mA drop at 13V feed
Vf @20mA is approximately 0.38V
Vf @10mA is approximately 0.35V

 $13 - 0.38 = 12.62\text{V}$ and $12.62 / 742 = 17\text{mA}$
 $13 - 0.35 = 12.65\text{V}$ and $12.65 / 742 = 17.04\text{mA}$

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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator4/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

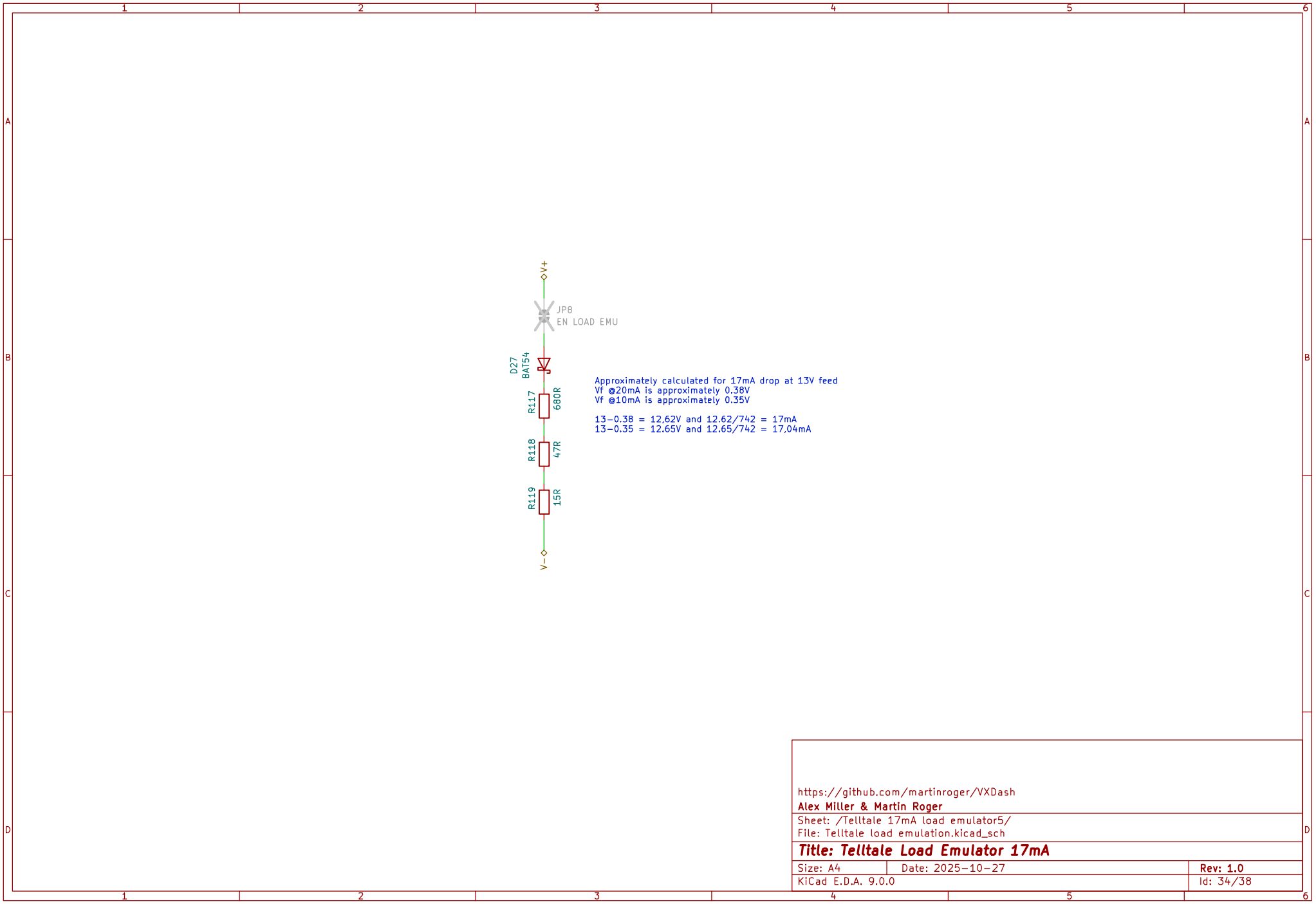
Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 33/38



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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator5/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

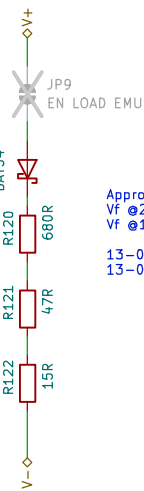
Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 34/38



Approximately calculated for 17mA drop at 13V feed
Vf @20mA is approximately 0.38V
Vf @10mA is approximately 0.35V
 $13 - 0.38 = 12.62\text{V}$ and $12.62 / 742 = 17\text{mA}$
 $13 - 0.35 = 12.65\text{V}$ and $12.65 / 742 = 17.04\text{mA}$

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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator6/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

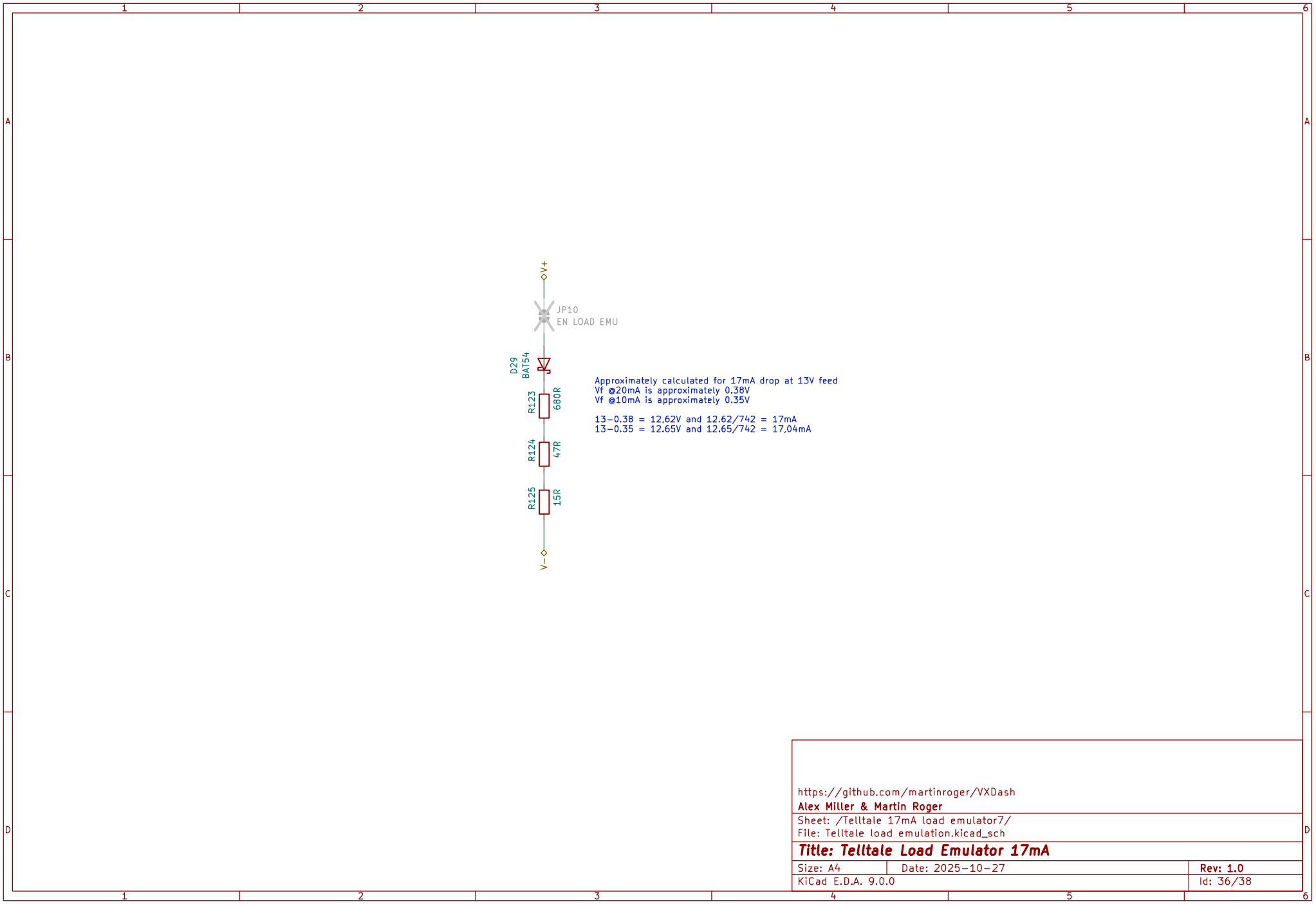
Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 35/38



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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator7/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

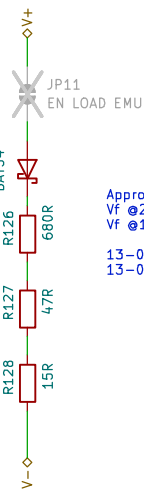
Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 36/38



Approximately calculated for 17mA drop at 13V feed
Vf @20mA is approximately 0.38V
Vf @10mA is approximately 0.35V
 $13 - 0.38 = 12.62\text{V}$ and $12.62 / 742 = 17\text{mA}$
 $13 - 0.35 = 12.65\text{V}$ and $12.65 / 742 = 17.04\text{mA}$

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

Alex Miller & Martin Roger

Sheet: /Telltale 17mA load emulator8/

File: Telltale load emulation.kicad_sch

Title: Telltale Load Emulator 17mA

Size: A4

Date: 2025-10-27

Rev: 1.0

KiCad E.D.A. 9.0.0

Id: 37/38