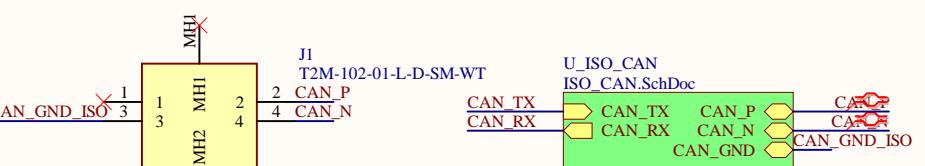
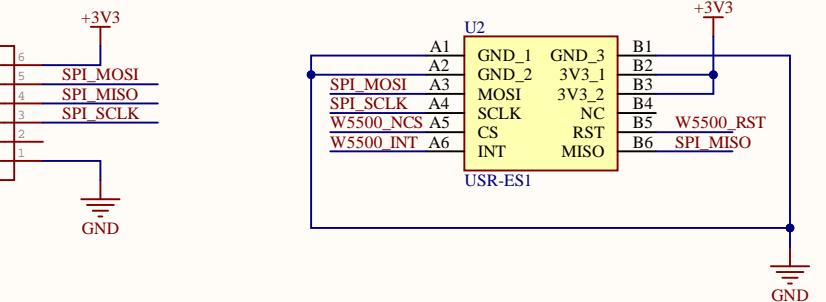


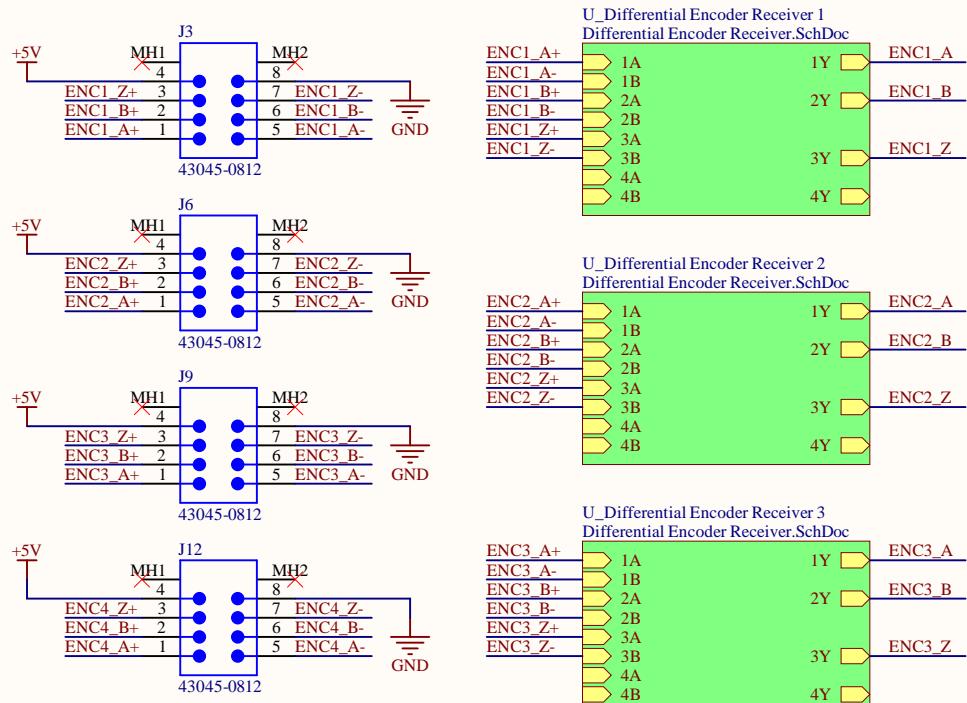
CAN connector + CAN chip



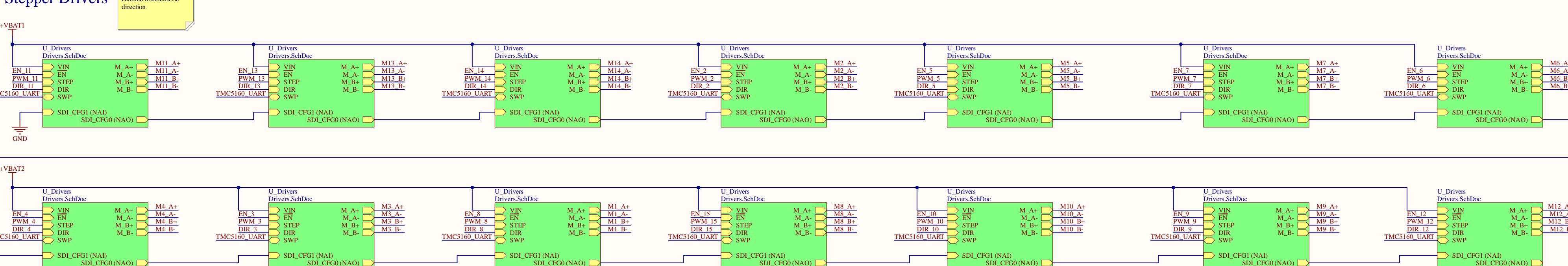
Ethernet W5500 module



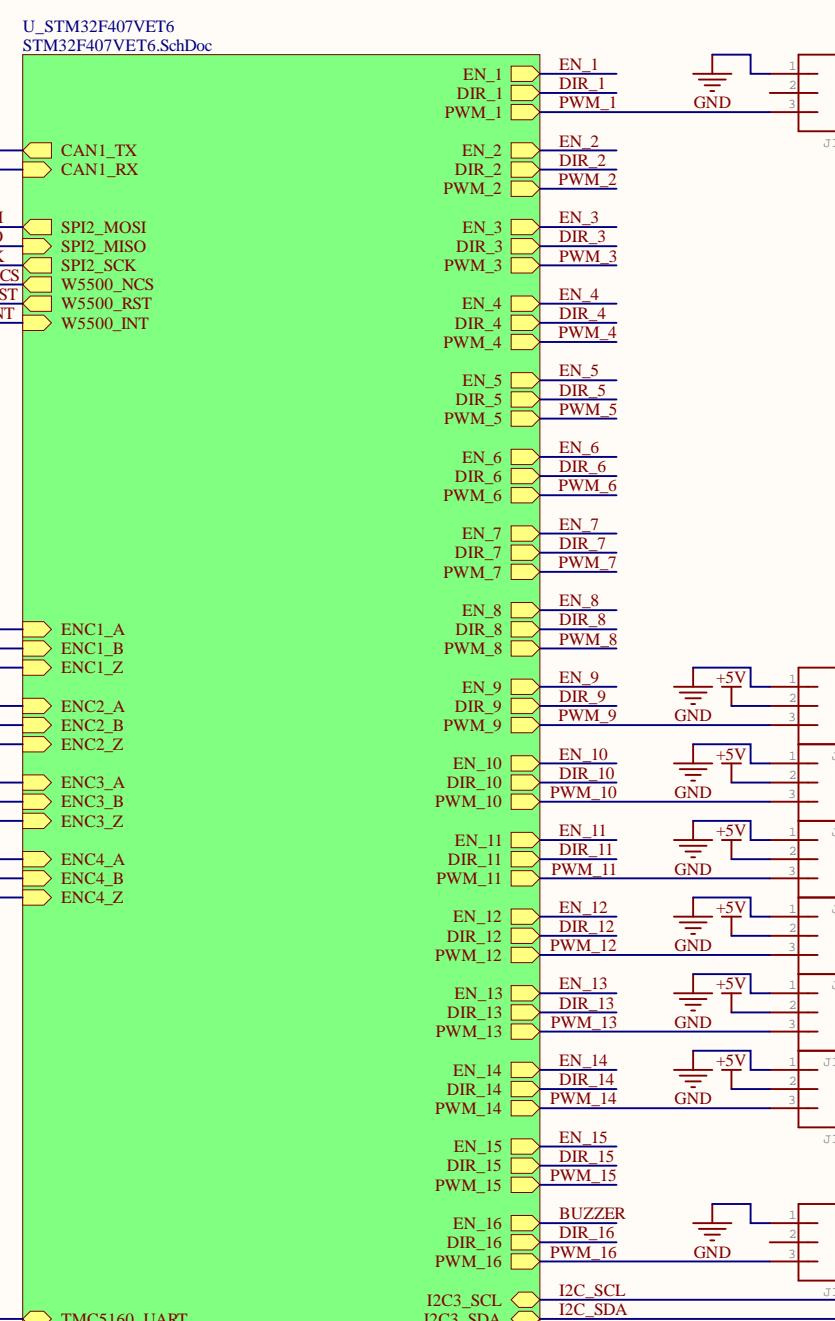
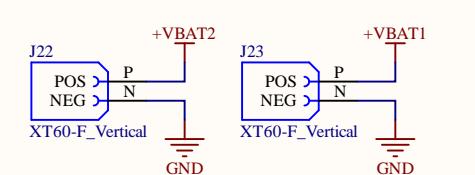
Differential receivers + connectors for encoder inputs



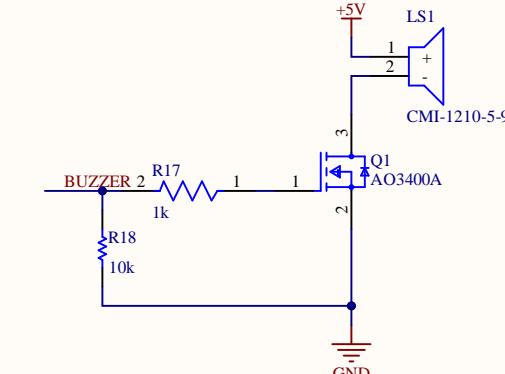
Stepper Drivers



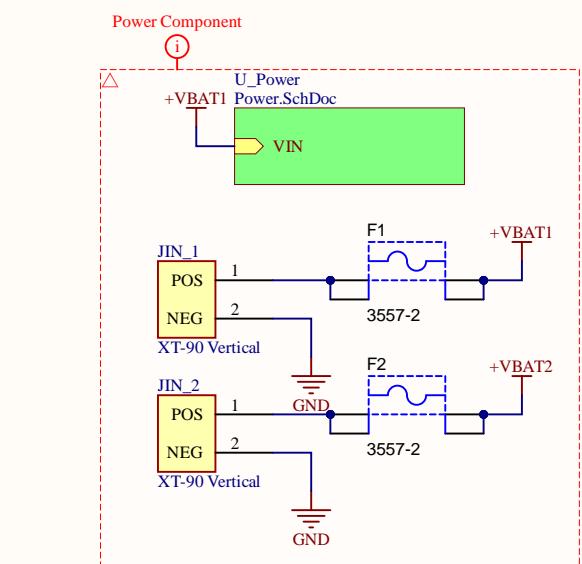
ESC Power Connectors



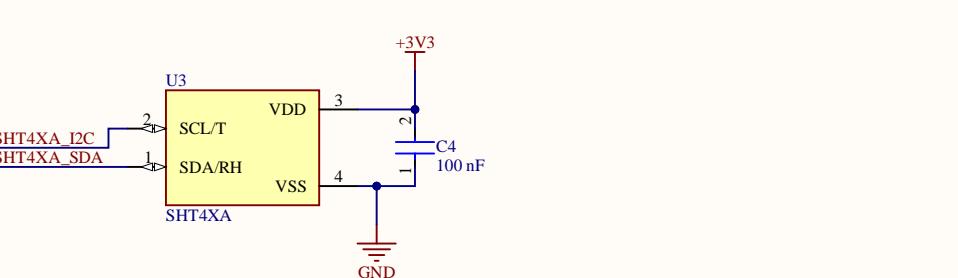
Buzzer for very serious stuff

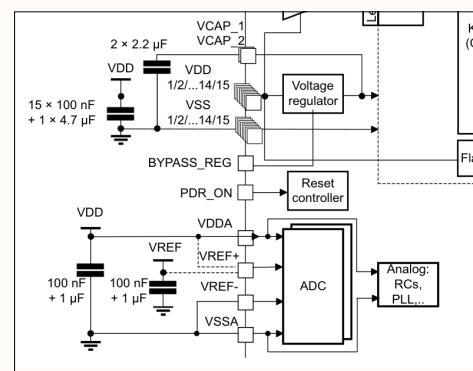
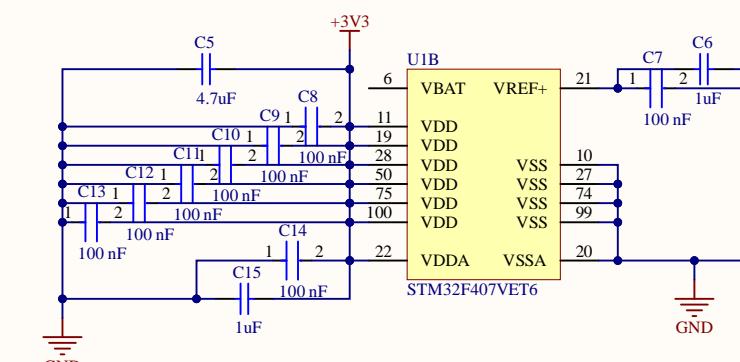


Battery Connectors and Buck Converter



Temperature + Humid Sensor

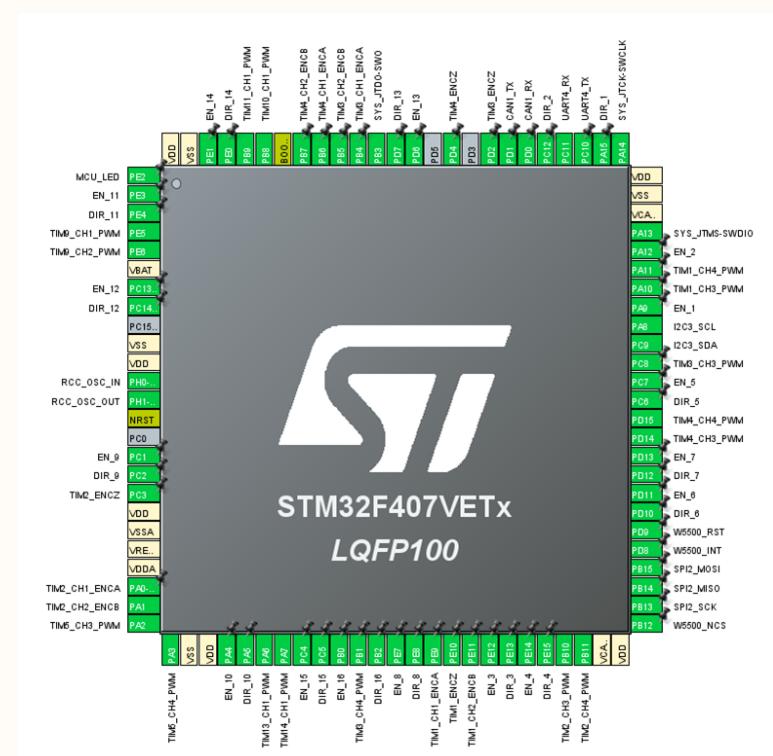
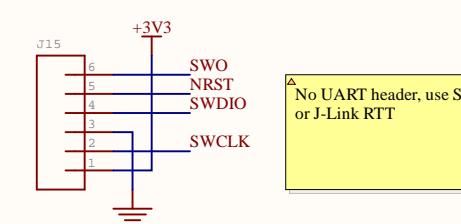
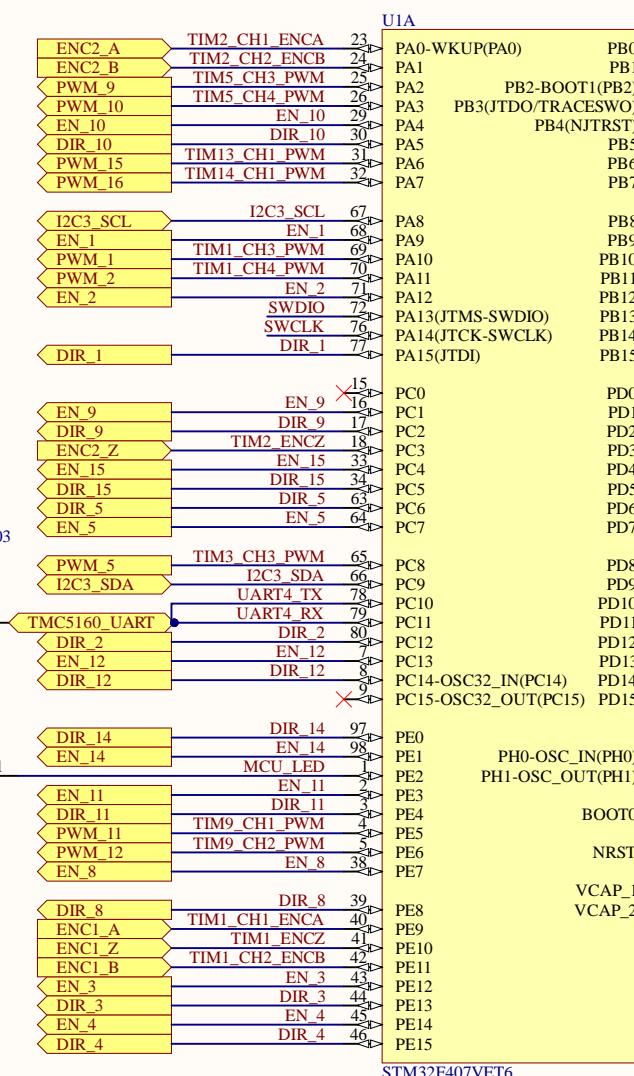




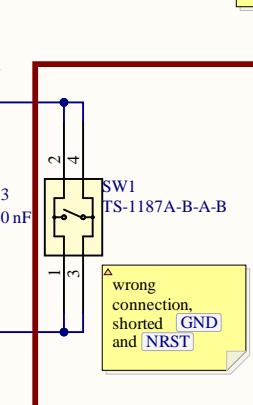
The following equation gives the expression of C_L :

$$C_L = \frac{C_{L1} \times C_{L2}}{C_{L1} + C_{L2}} - C_s$$

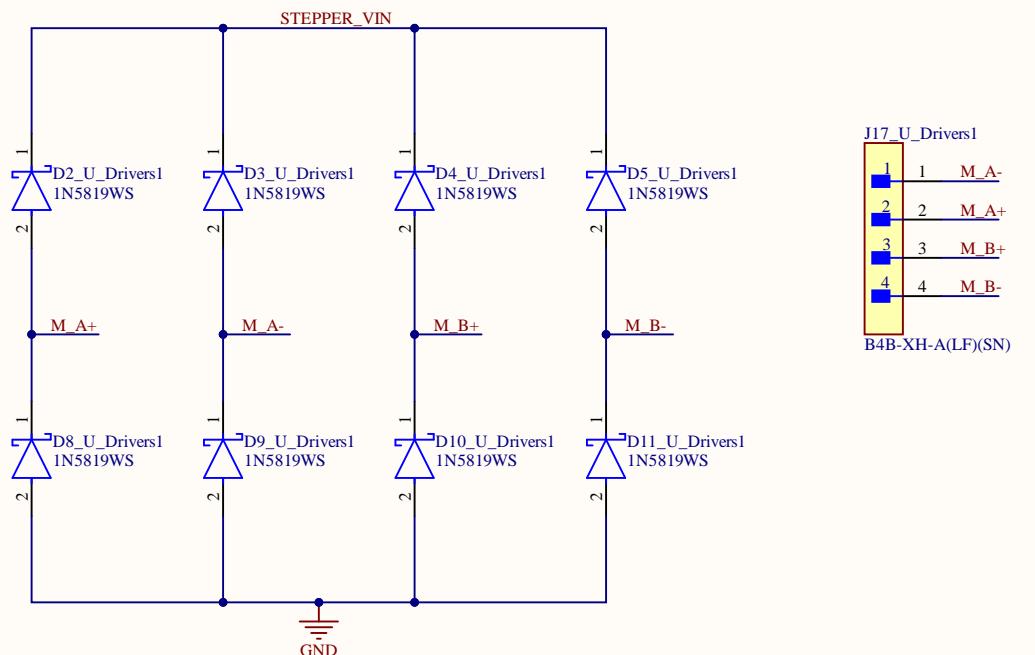
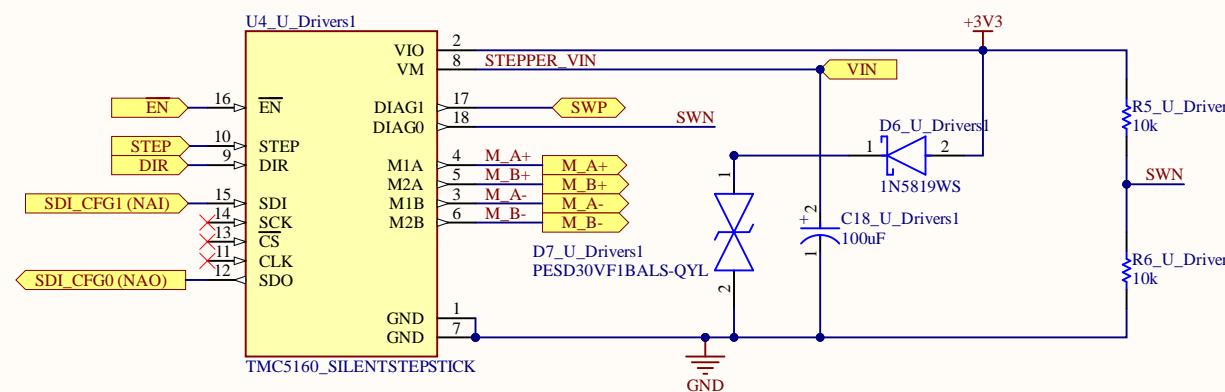
For C_{L1} and C_{L2} , it is recommended to use high-quality external ceramic capacitors in the 5 pF to 20 pF range (typ.), designed for high-frequency applications, and selected to match the requirements of the crystal or resonator (see Figure 32). C_{L1} and C_{L2} are usually the same size. The crystal manufacturer typically specifies a load capacitance which is the series combination of C_{L1} and C_{L2} . PCB and MCU pin capacitance must be included (10 pF can be used as a rough estimate of the combined pin and board capacitance) when sizing C_{L1} and C_{L2} .



▲ schematic nets naming is based on this ioc (different from the one in basecamp)
pin functionalities are the same

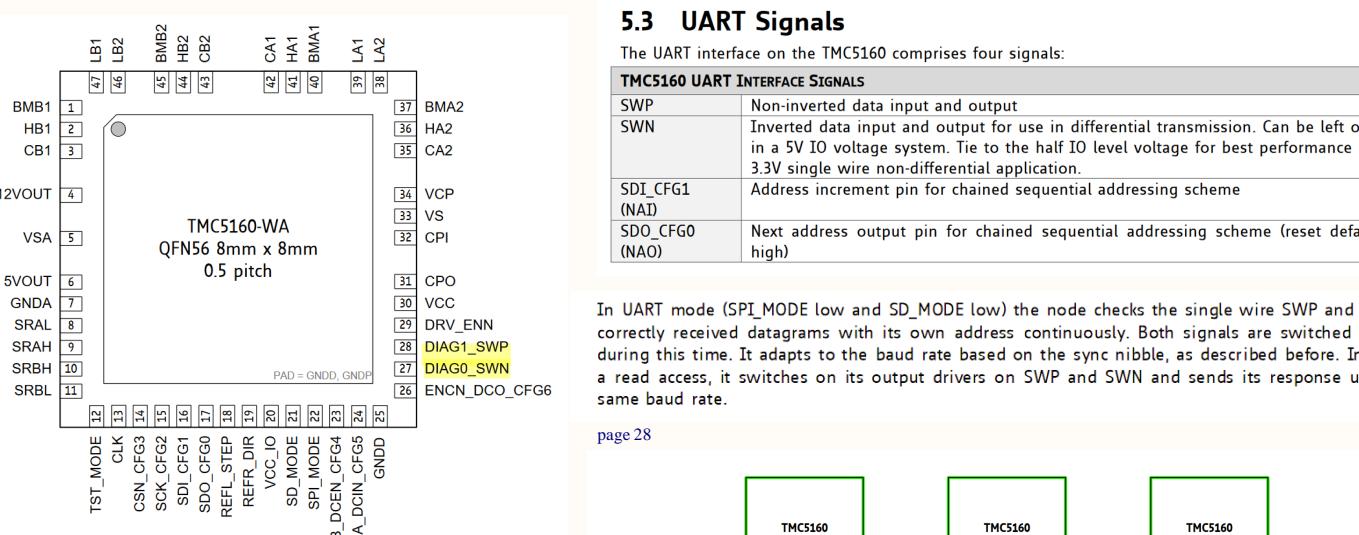


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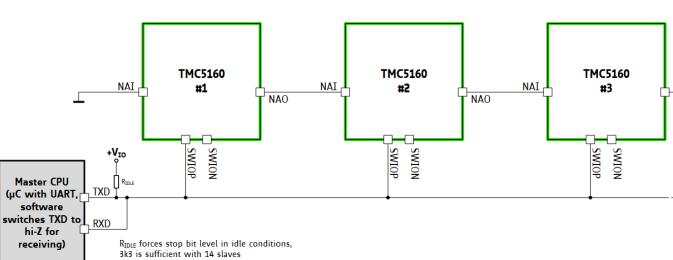


A Addressing multiple slaves with UART mode

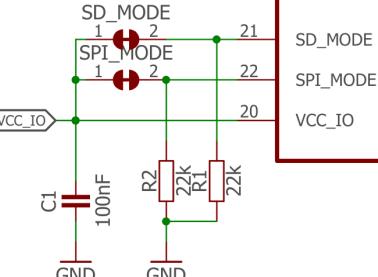
https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



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page 29



SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

B Powering

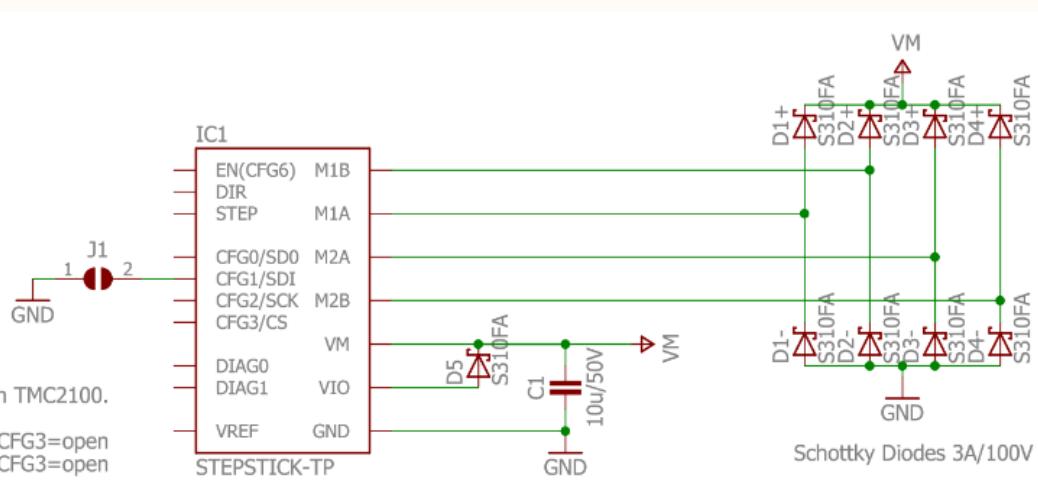
Circuit protection

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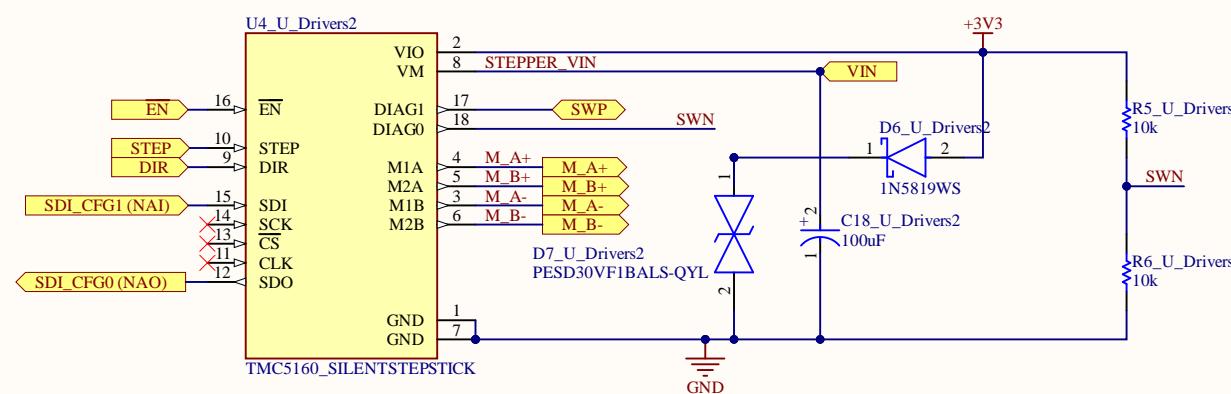
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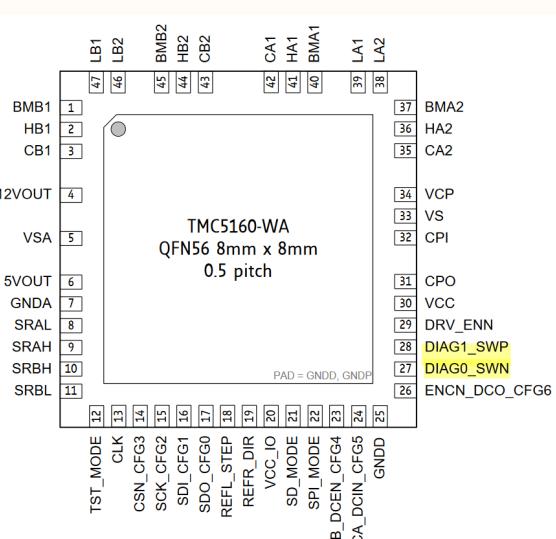
silentstepstick protector schematic

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A Addressing multiple slaves with UART mode

https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



5.3 UART Signals

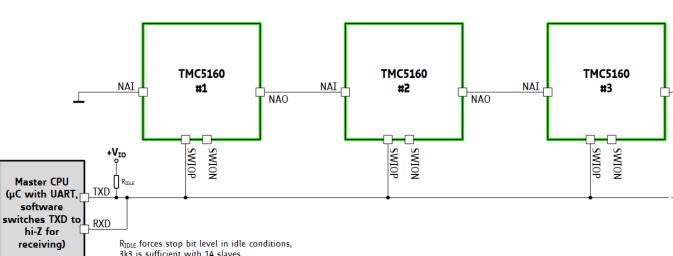
The UART interface on the TMC5160 comprises four signals:

TMC5160 UART INTERFACE SIGNALS

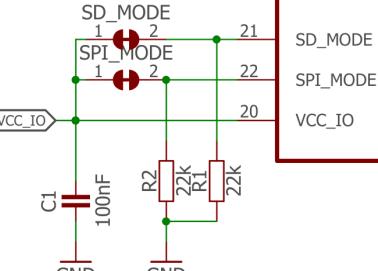
SWP	Non-inverted data input and output
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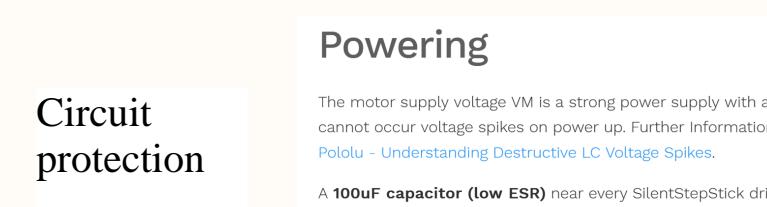
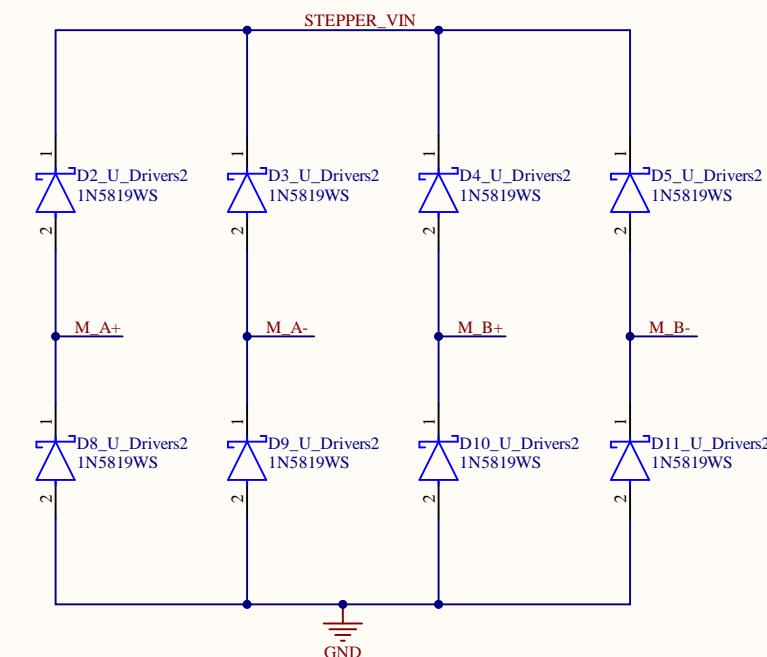
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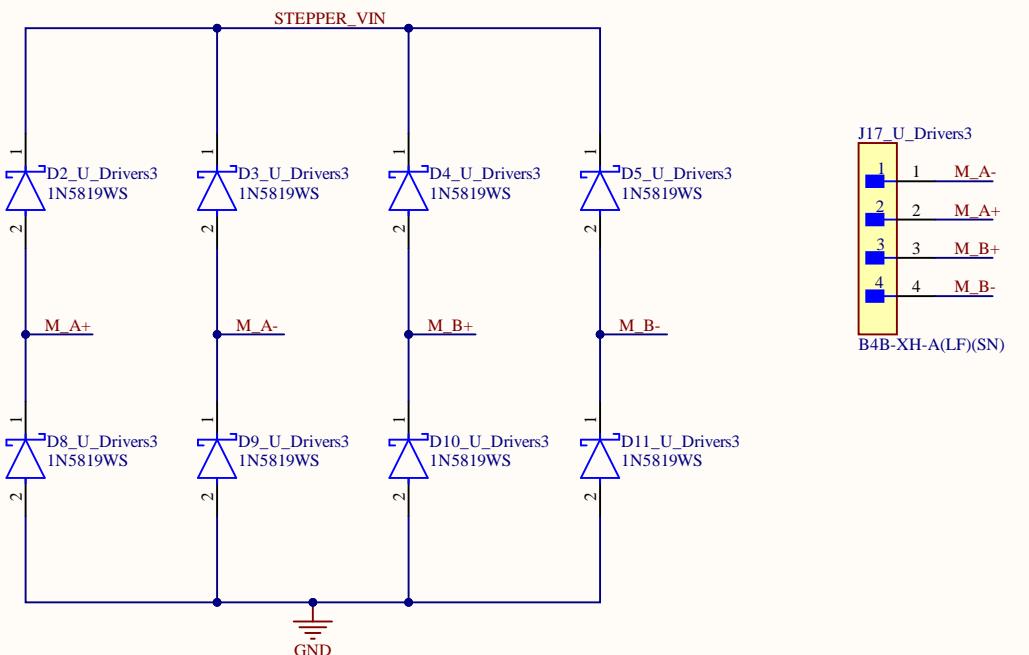
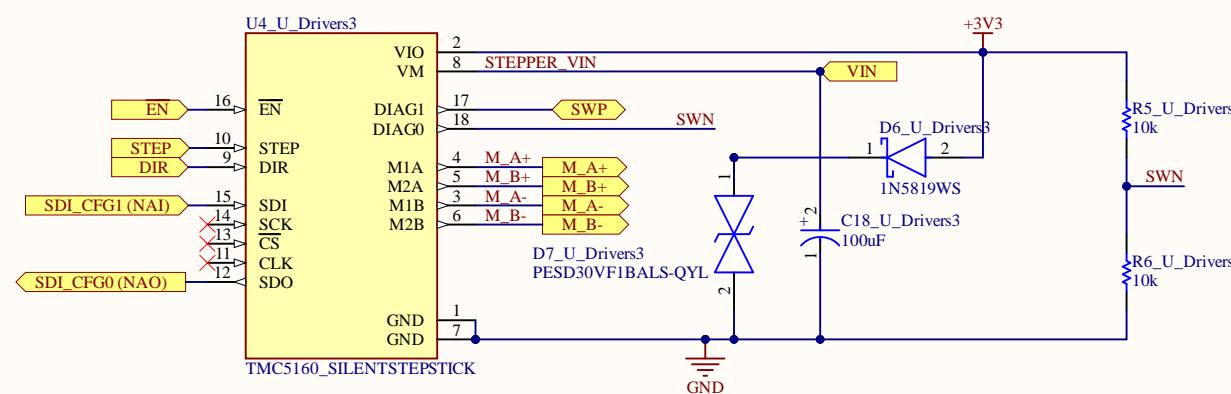


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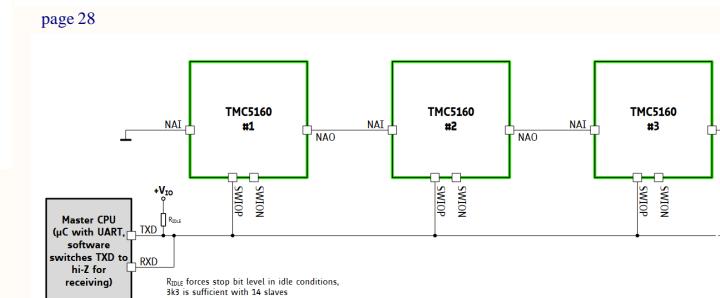
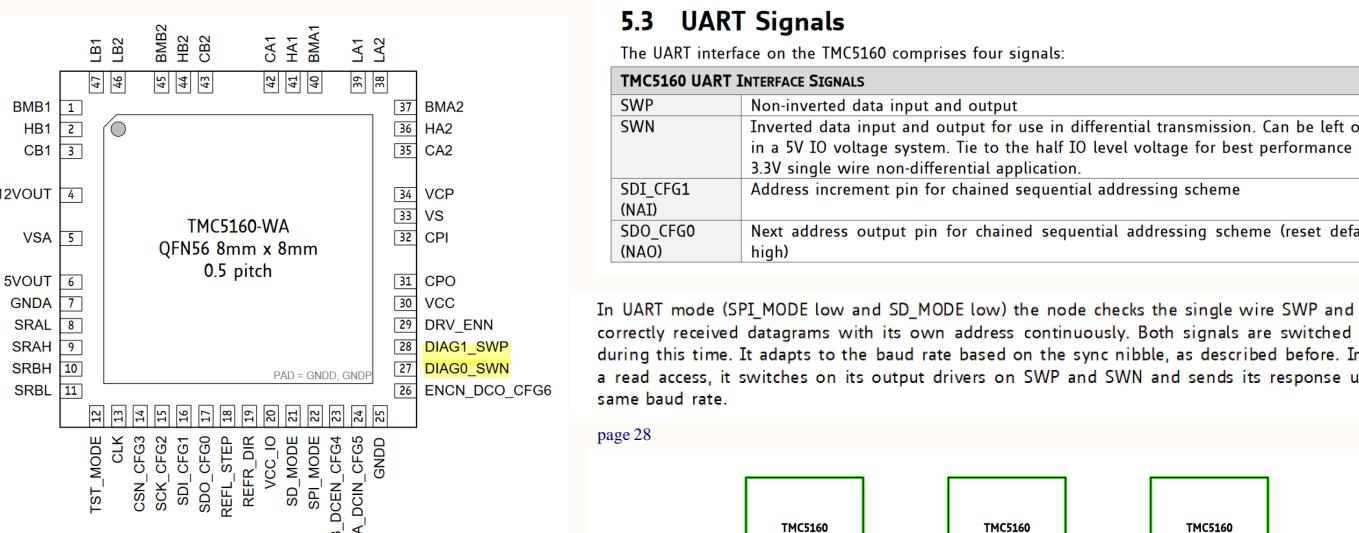
silentstepstick protector schematic

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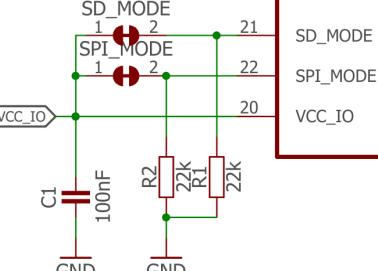


A Addressing multiple slaves with UART mode

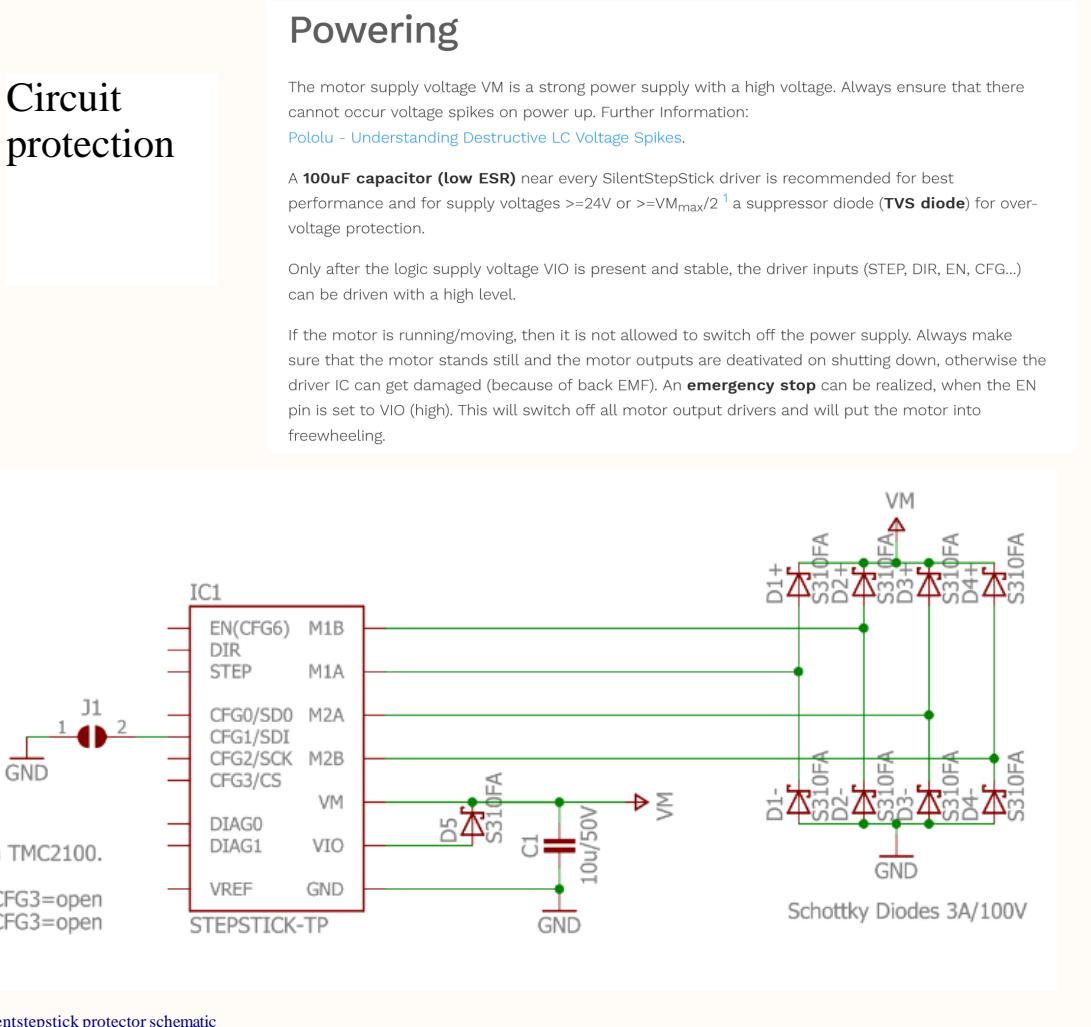
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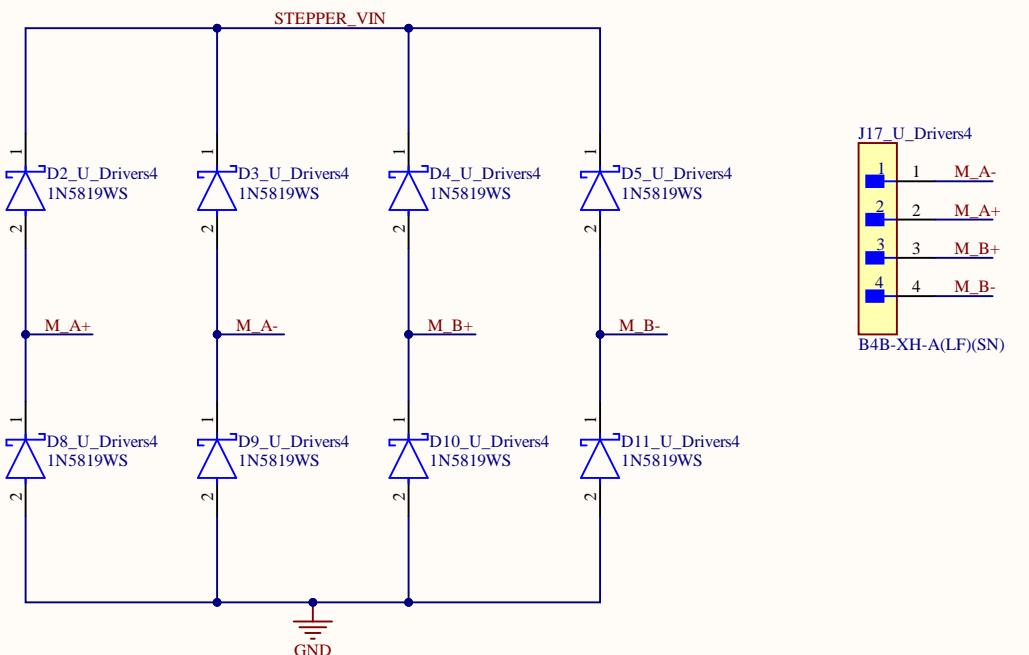
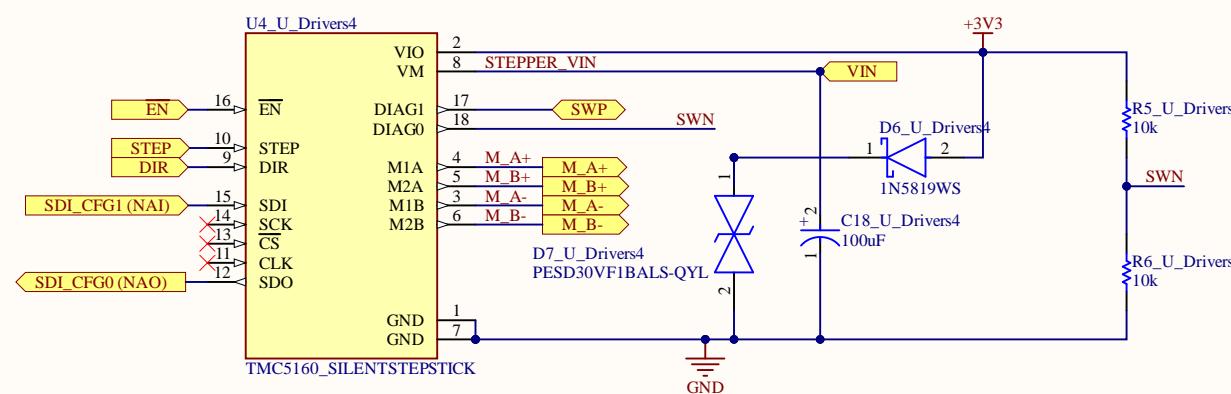
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

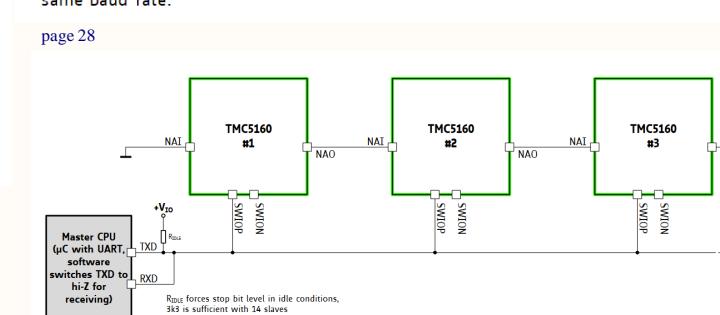
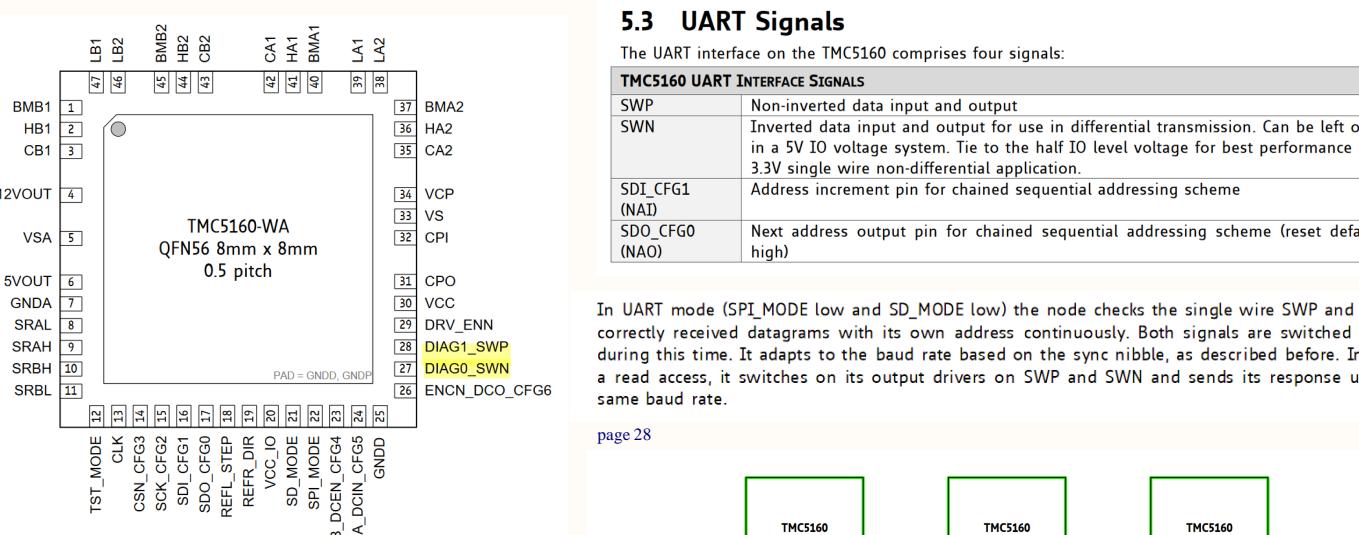


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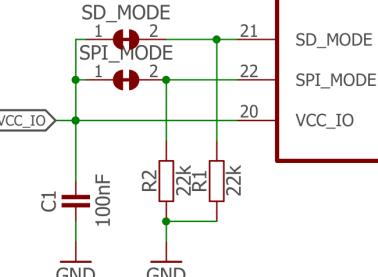


A Addressing multiple slaves with UART mode

https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



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B Powering

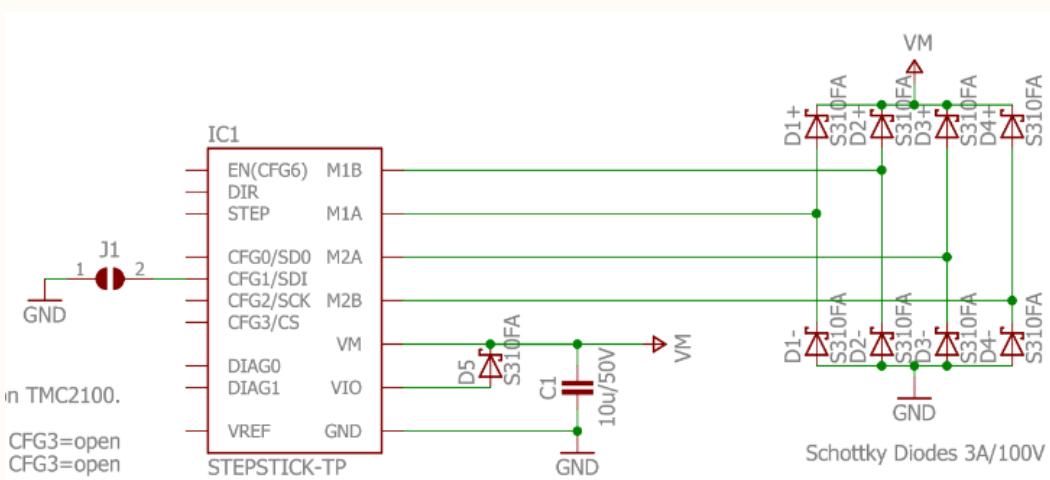
Circuit protection

The motor supply voltage VM is a strong power supply with a high voltage. Always ensure that there cannot occur voltage spikes on power up. Further Information: [Pololu - Understanding Destructive LC Voltage Spikes](#).

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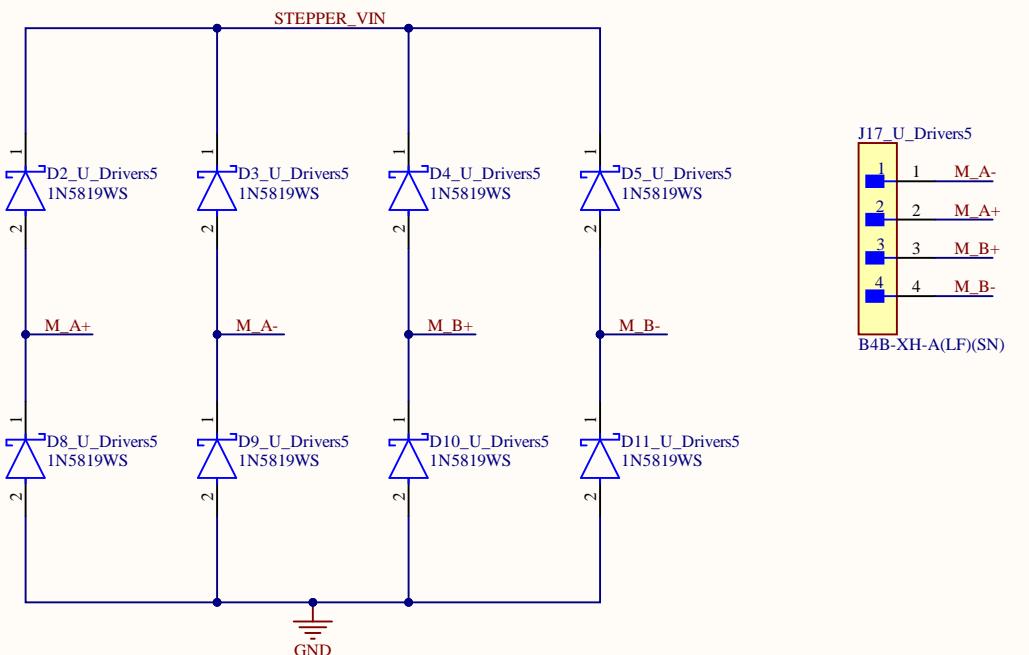
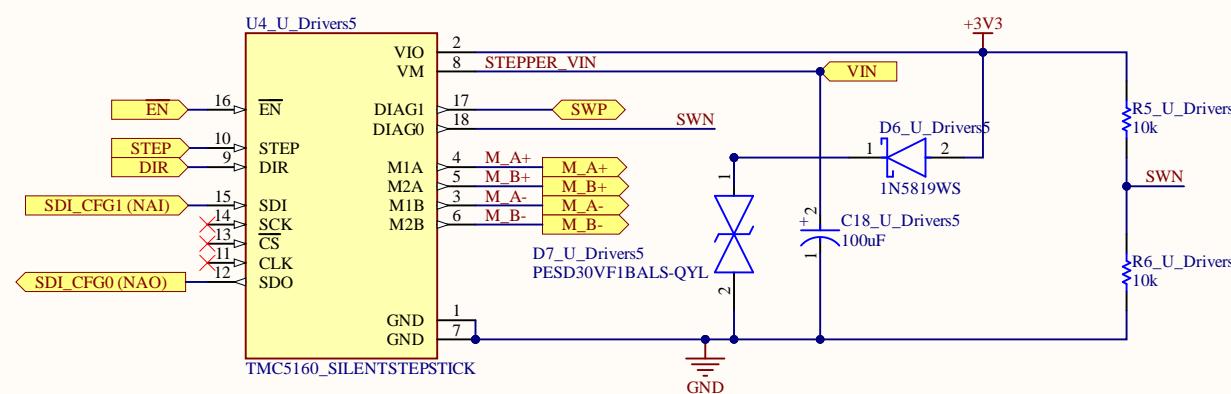
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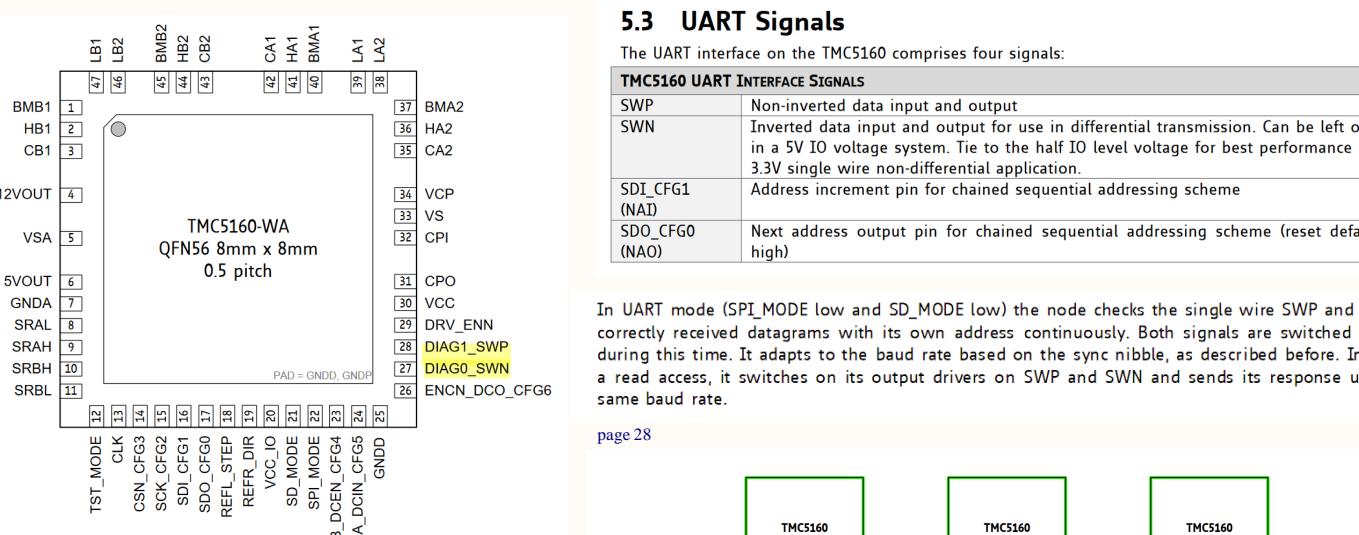
silentstepstick protector schematic

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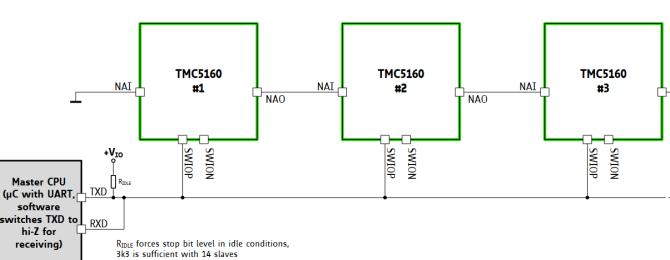


A Addressing multiple slaves with UART mode

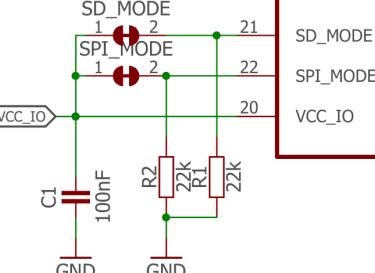
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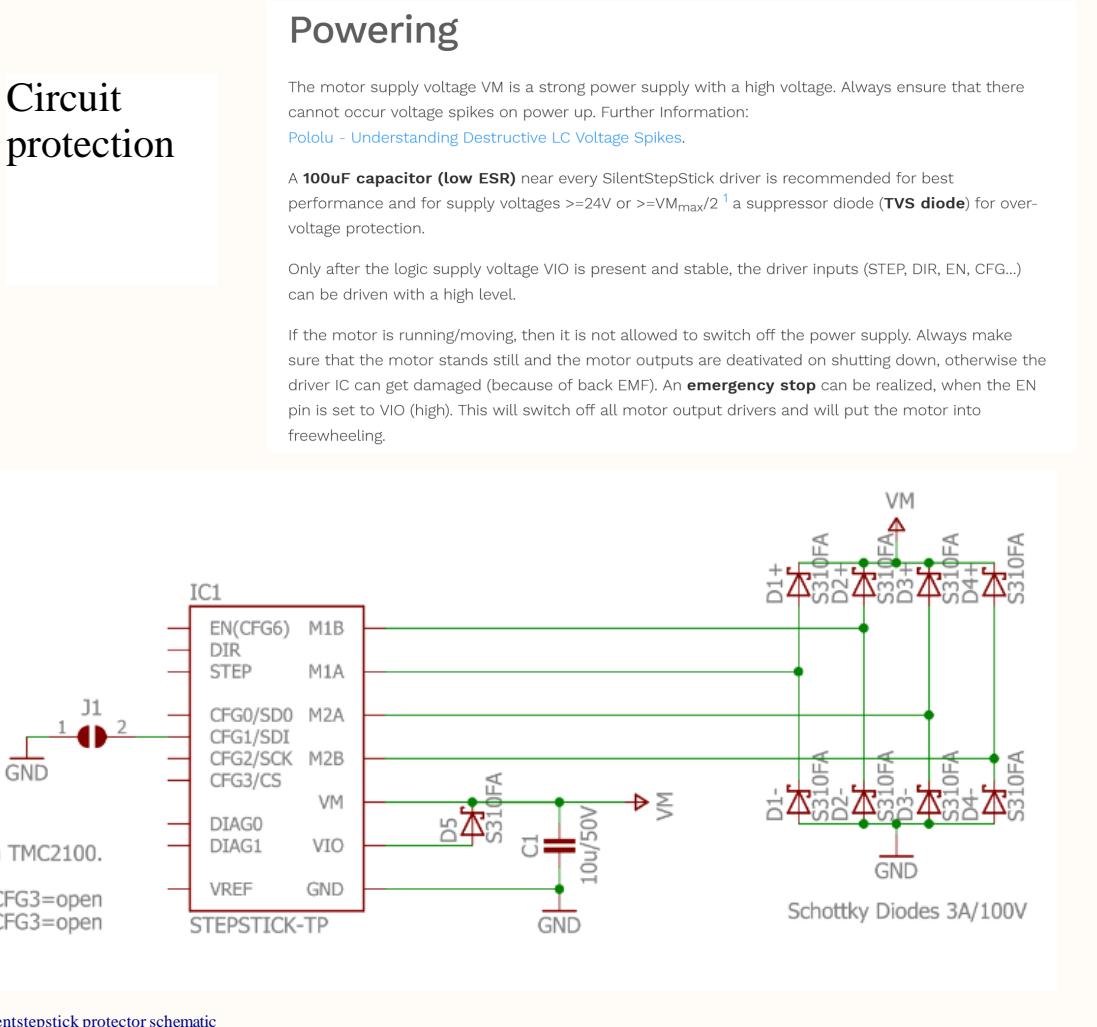
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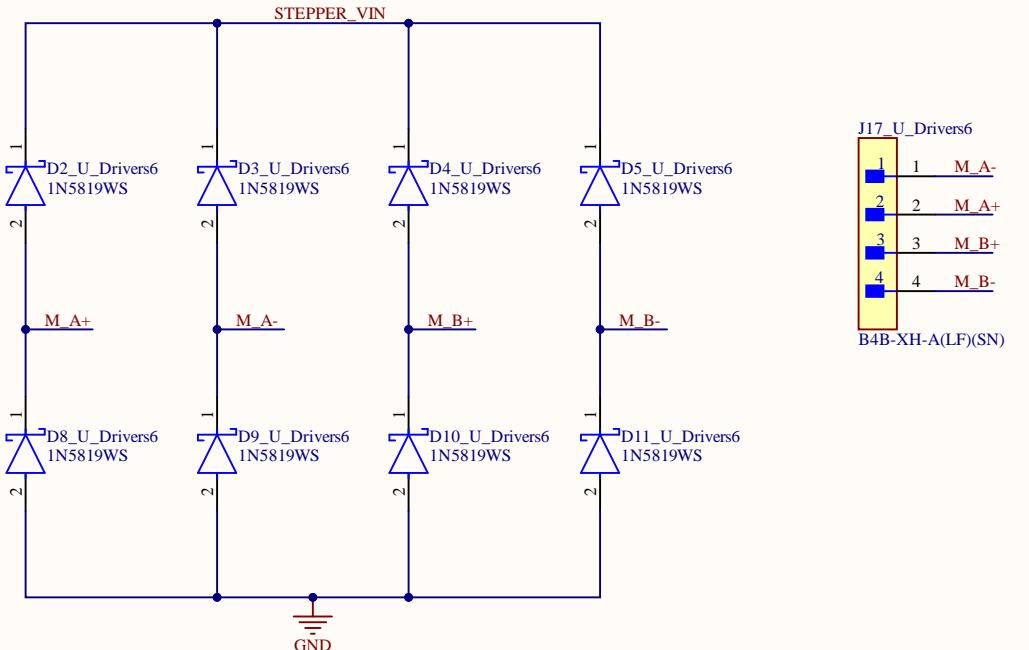
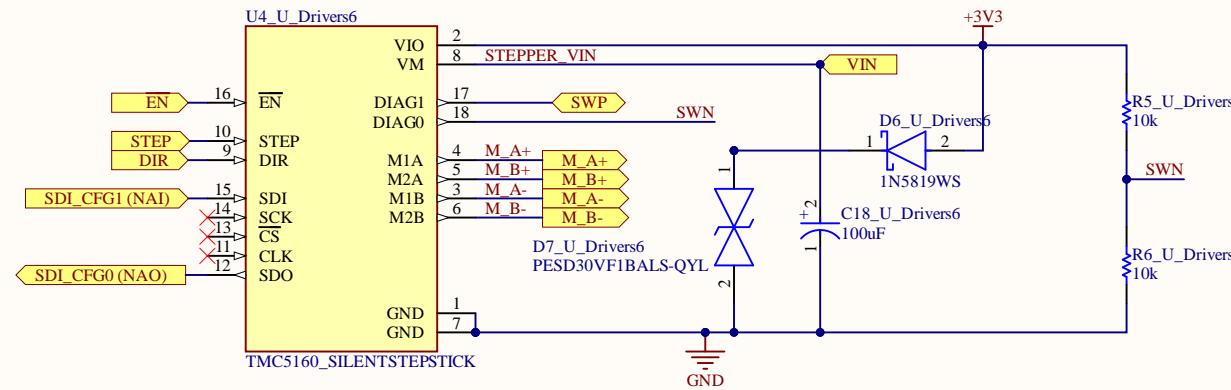
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

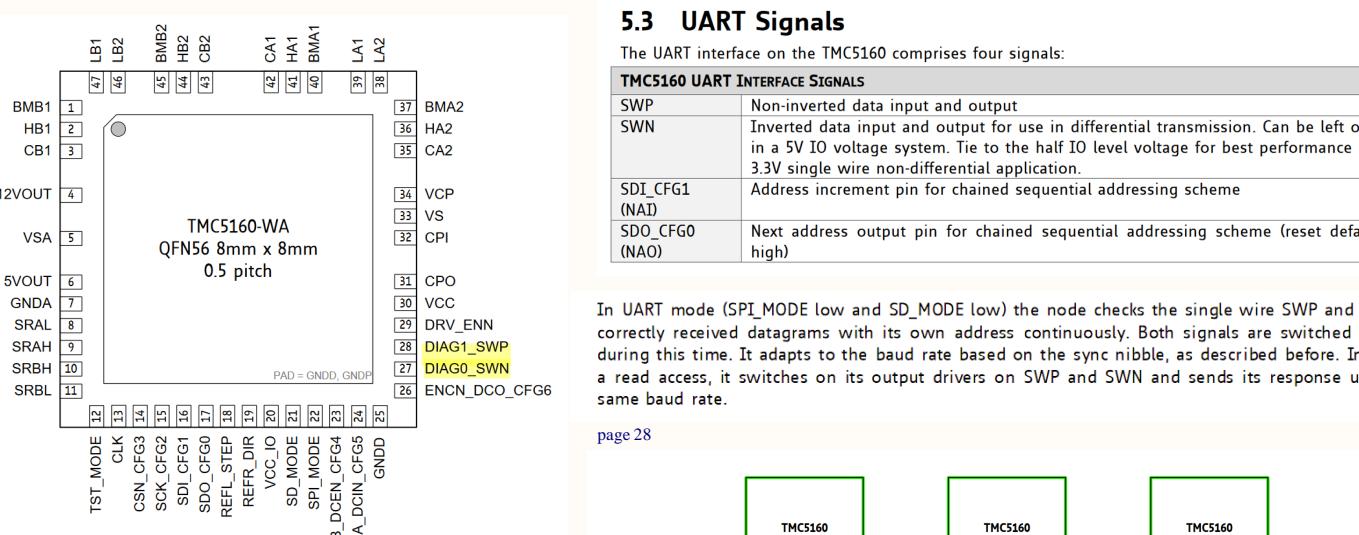


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A Addressing multiple slaves with UART mode

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5.3 UART Signals

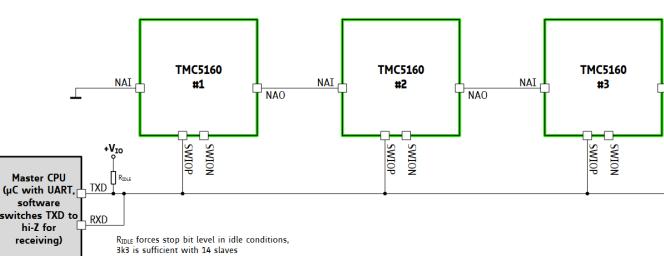
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TMC5160 UART INTERFACE SIGNALS

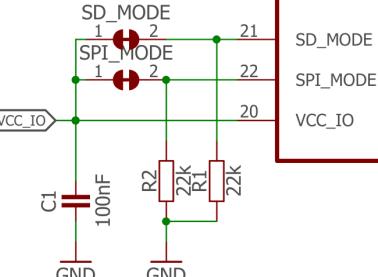
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page 29



SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

B Powering

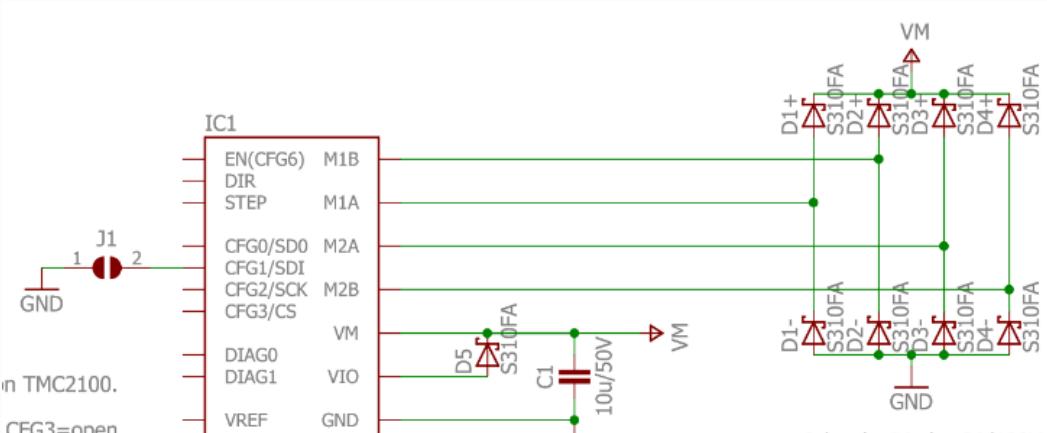
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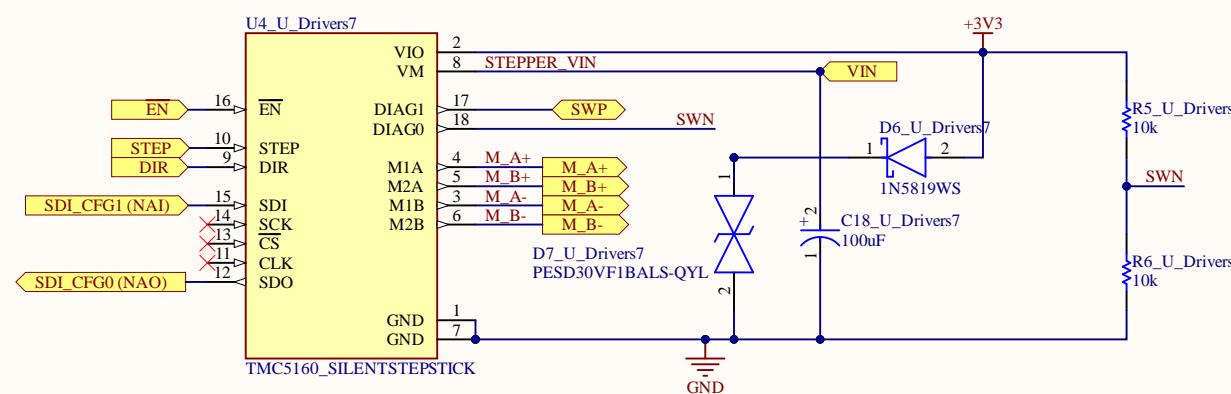
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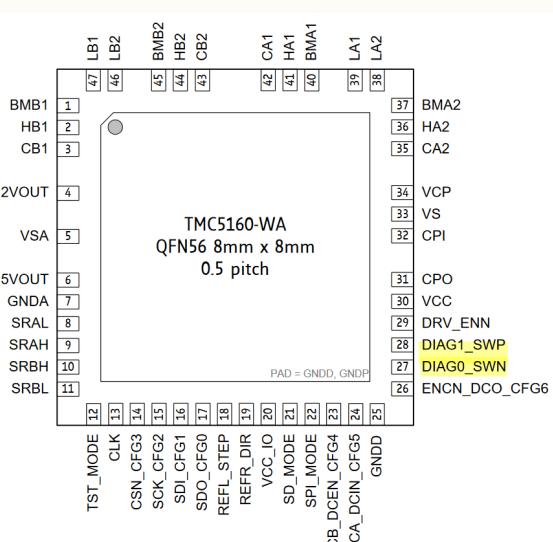
silentstepstick protector schematic

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A Addressing multiple slaves with UART mode

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5.3 UART Signals

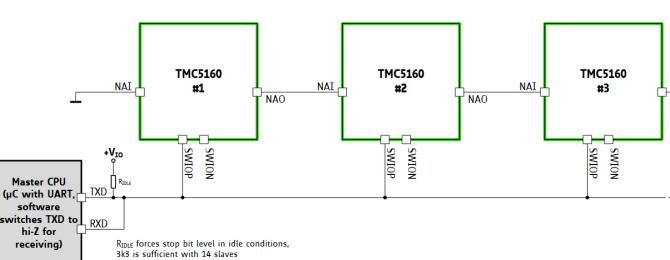
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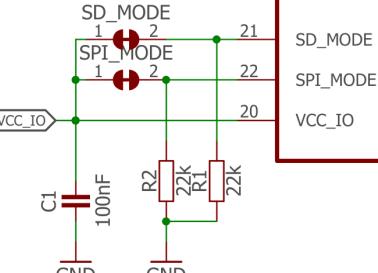
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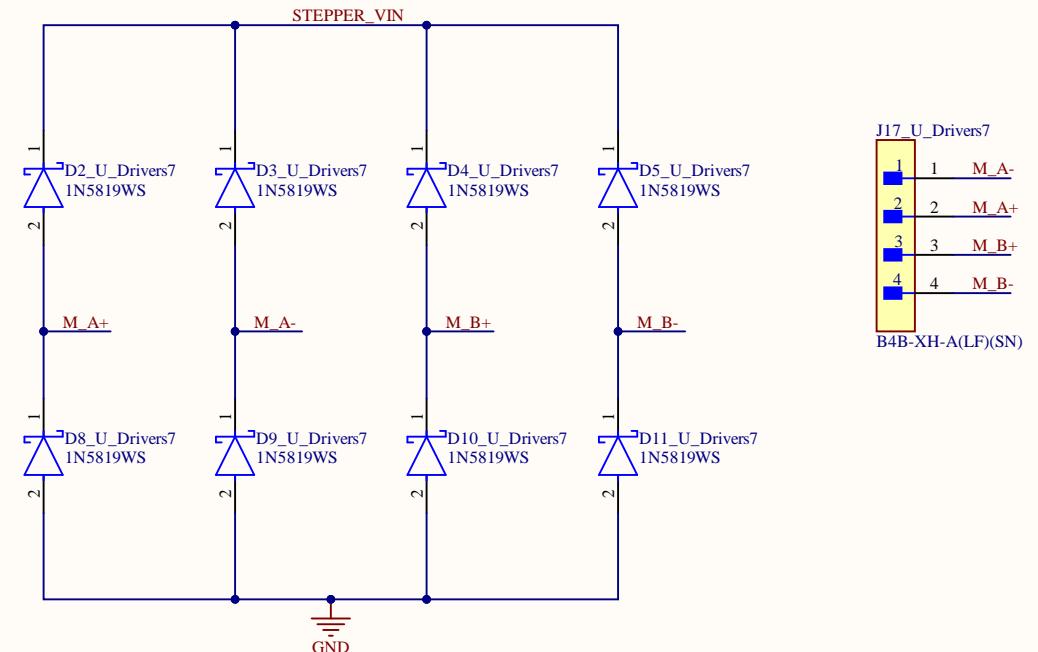
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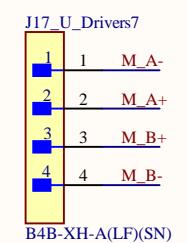
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)



STEPPER_VIN



J17_U_Drivers7
1 M_A-
2 M_A+
3 M_B-
4 M_B+

B4B-XH-A(LF)(SN)

B Powering

Circuit protection

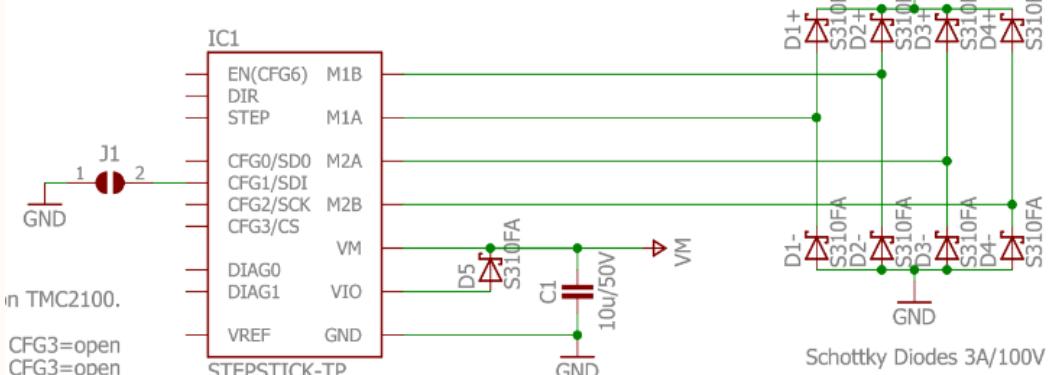
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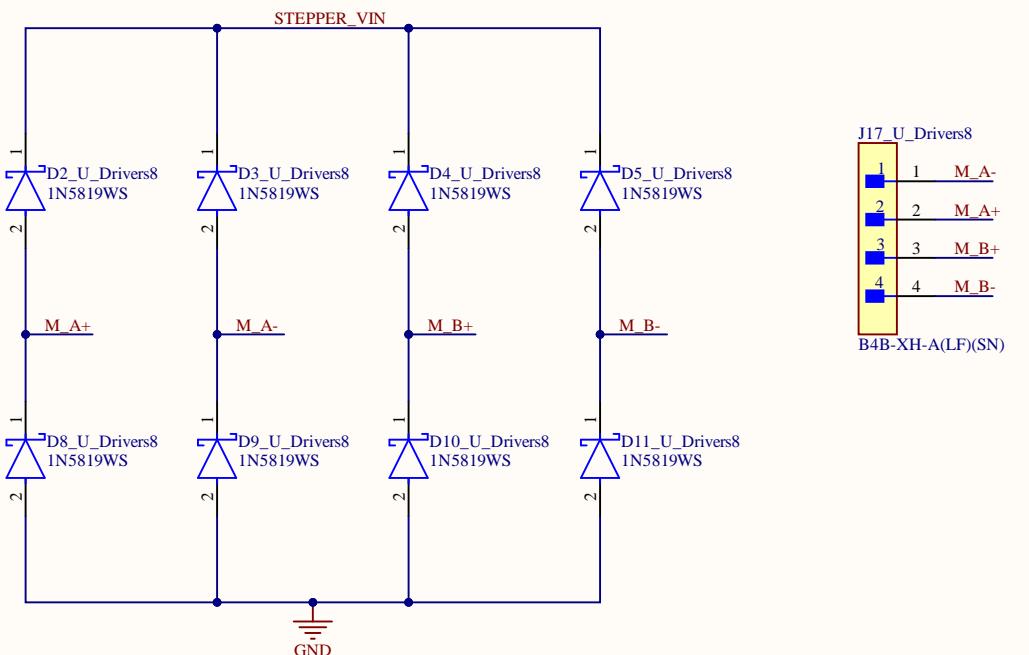
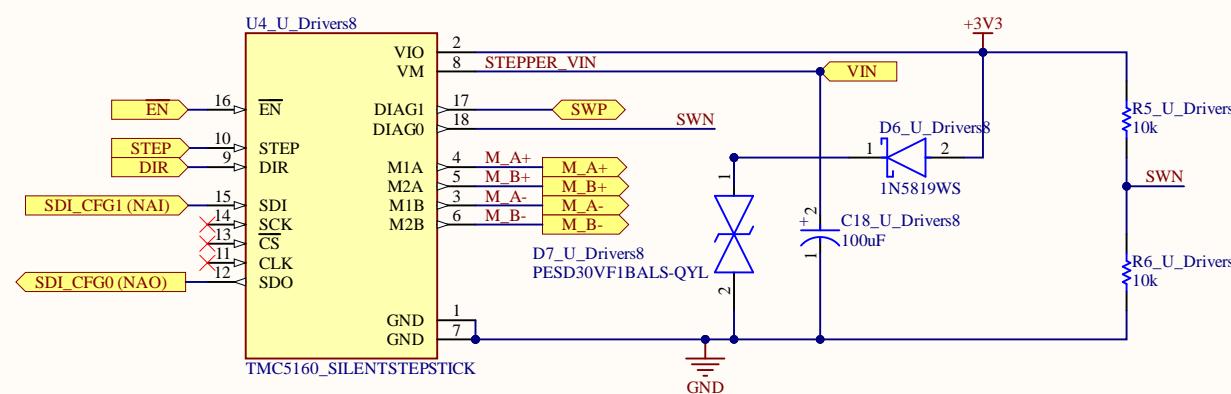
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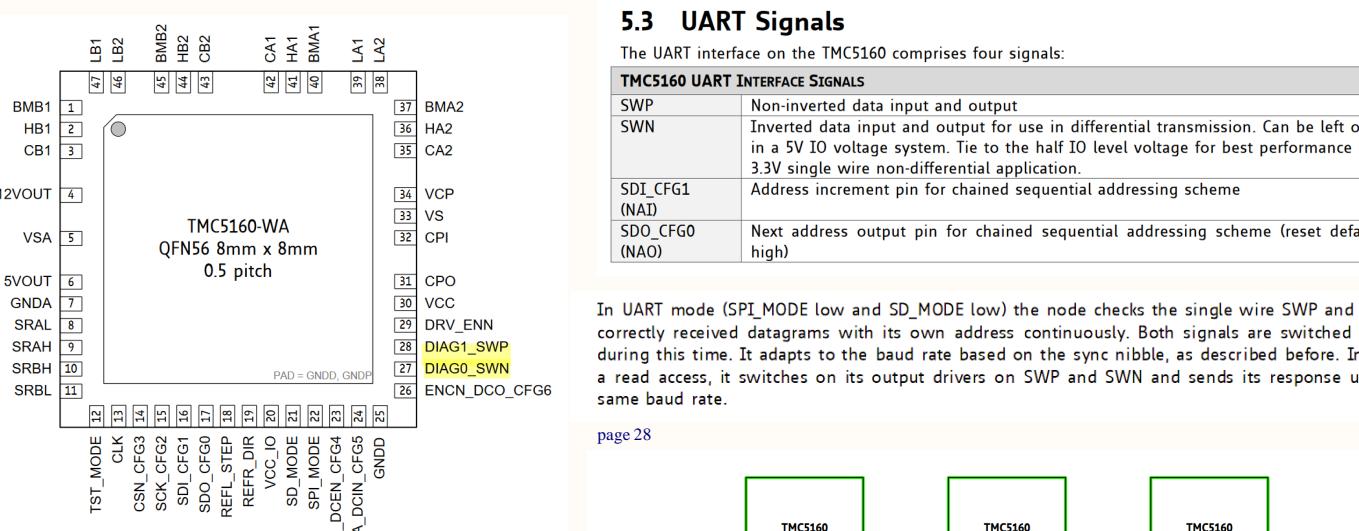
silentstepstick protector schematic

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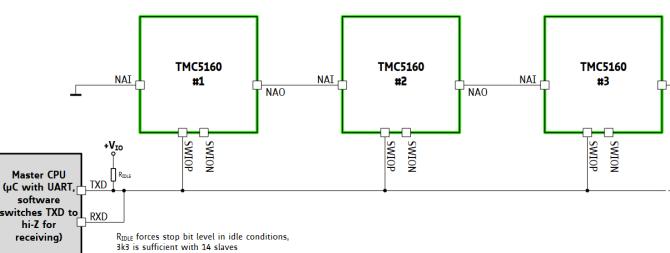


A Addressing multiple slaves with UART mode

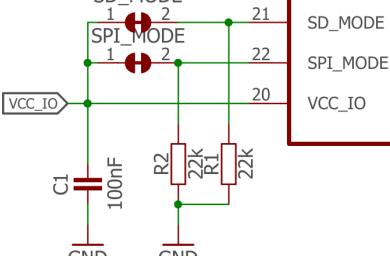
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

page 29

B Powering

Circuit protection

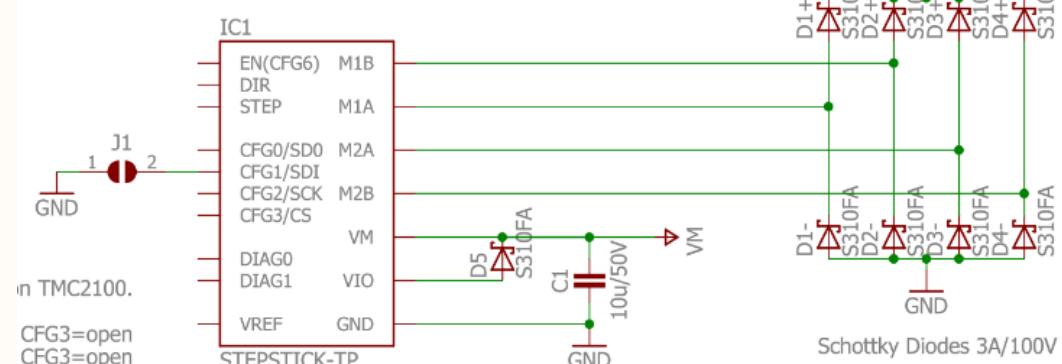
The motor supply voltage VM is a strong power supply with a high voltage. Always ensure that there cannot occur voltage spikes on power up. Further Information:

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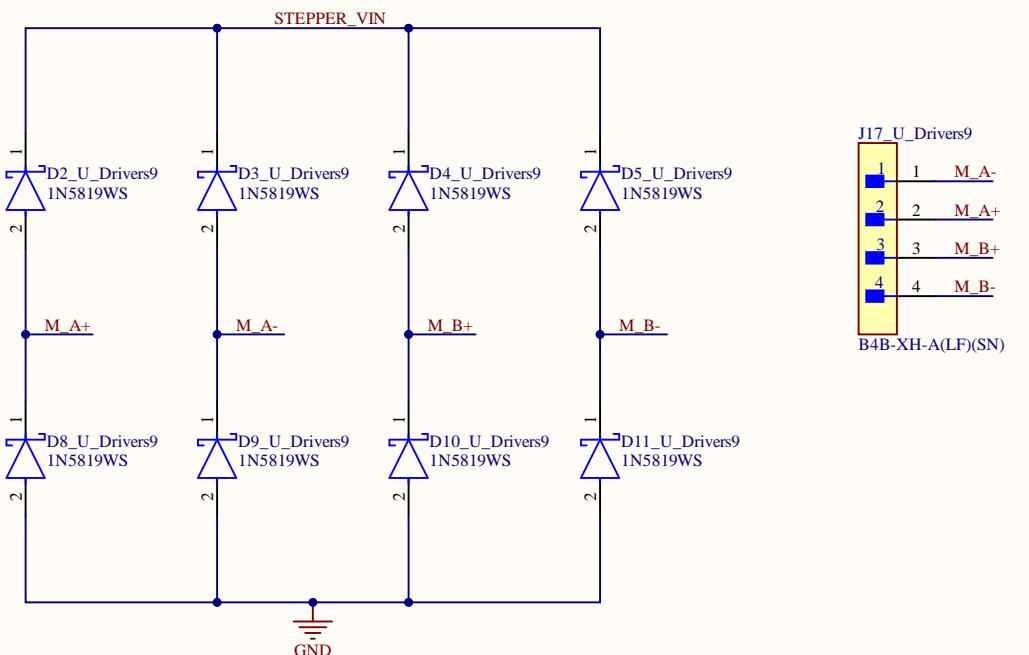
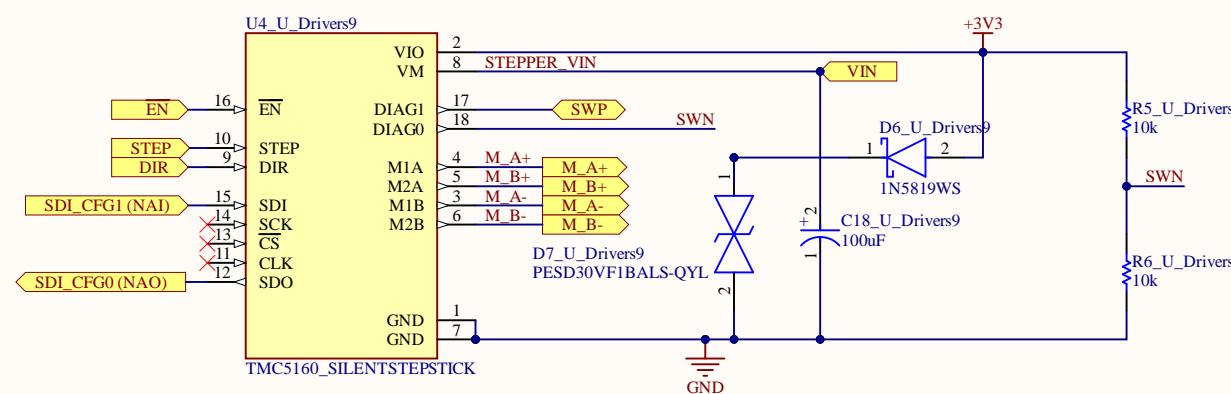
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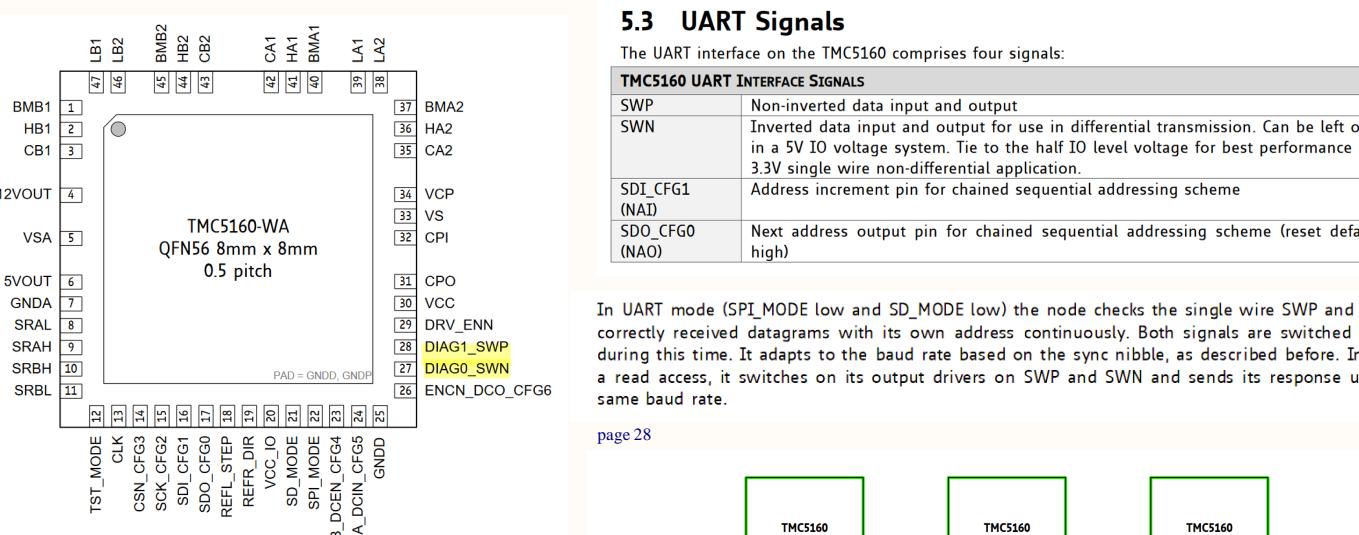
silentstepstick protector schematic

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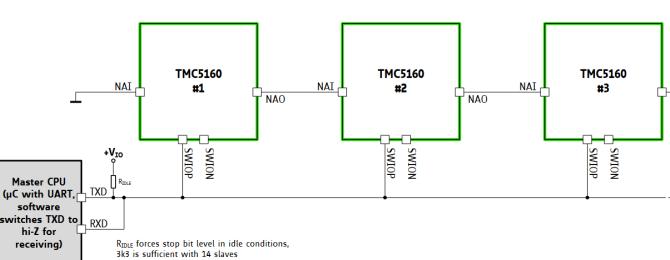


A Addressing multiple slaves with UART mode

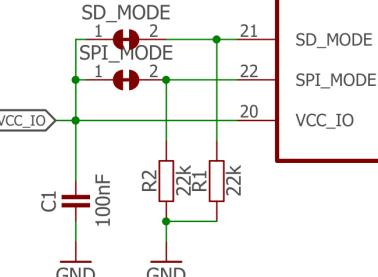
https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



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page 29



SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

B Powering

Circuit protection

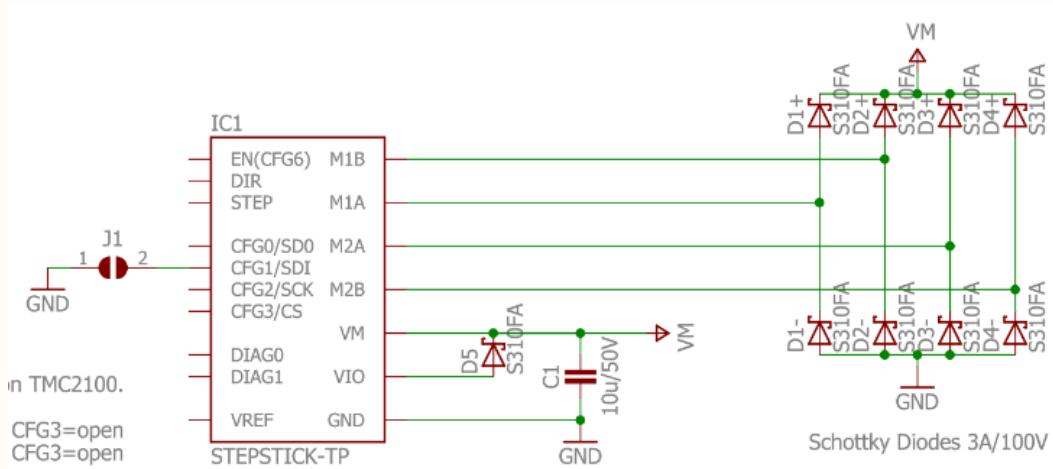
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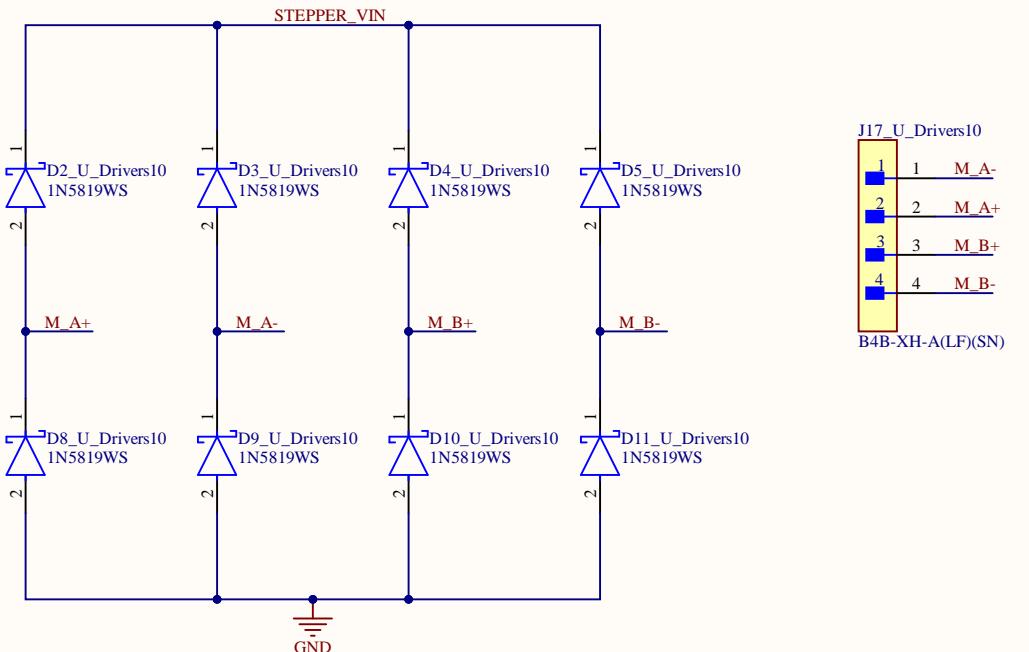
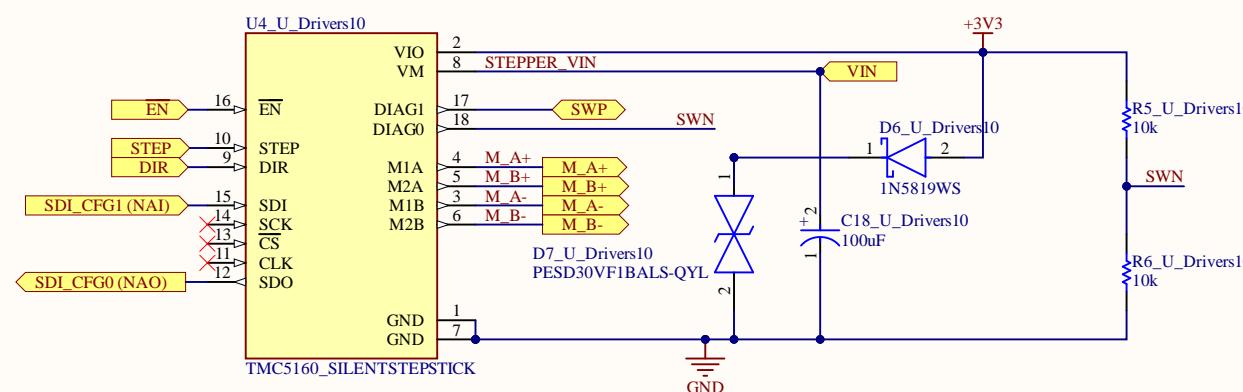
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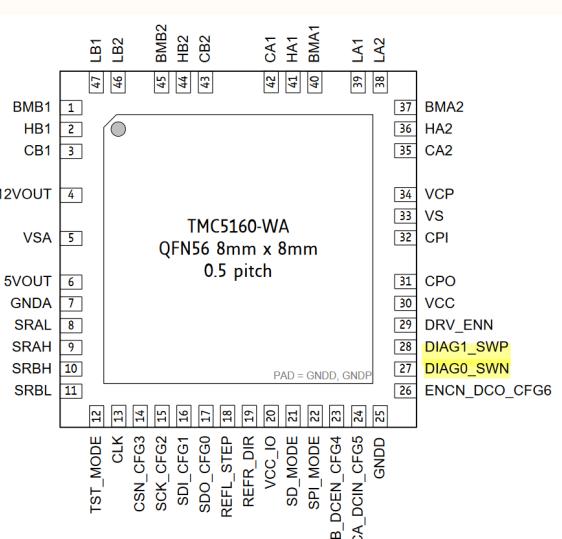
silentstepstick protector schematic

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A Addressing multiple slaves with UART mode

https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



5.3 UART Signals

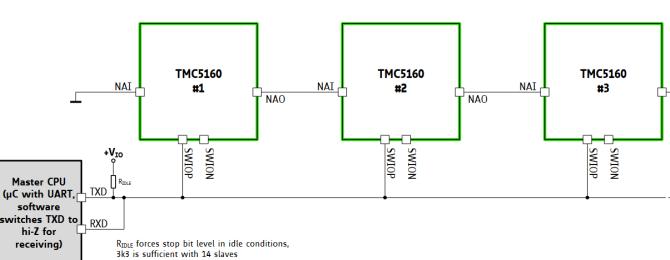
The UART interface on the TMC5160 comprises four signals:

TMC5160 UART INTERFACE SIGNALS

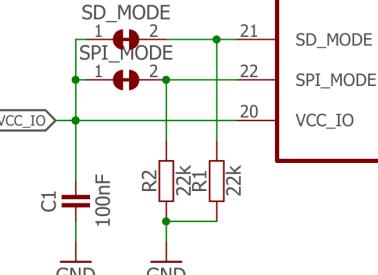
SWP	Non-inverted data input and output
SWN	Inverted data input and output for use in differential transmission. Can be left open in a 5V IO voltage system. Tie to the half IO level voltage for best performance in a 3.3V single wire non-differential application.
SDI_CFG1(NAI)	Address increment pin for chained sequential addressing scheme
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

B Powering

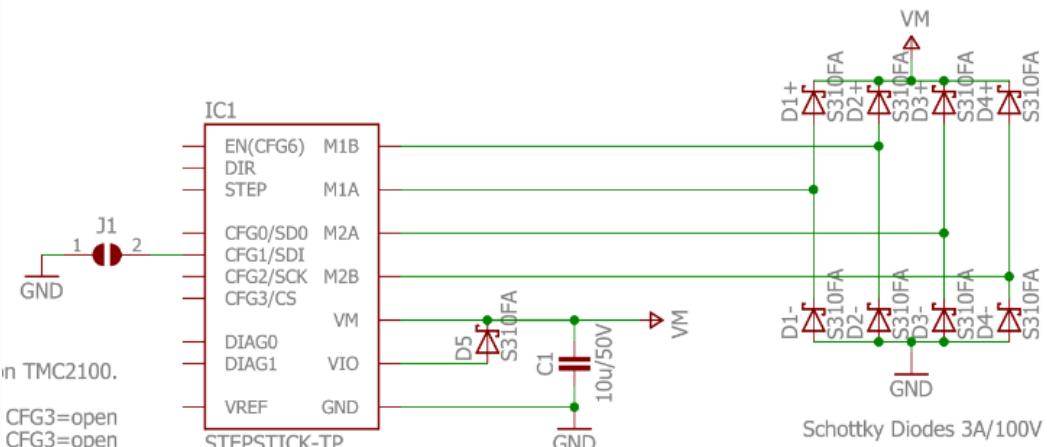
Circuit protection

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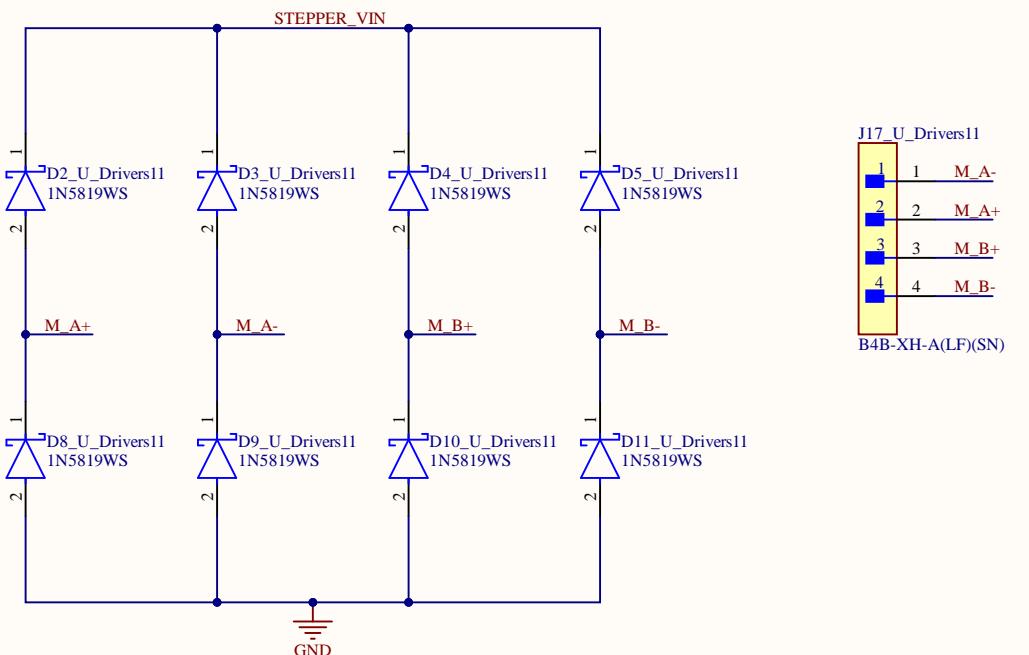
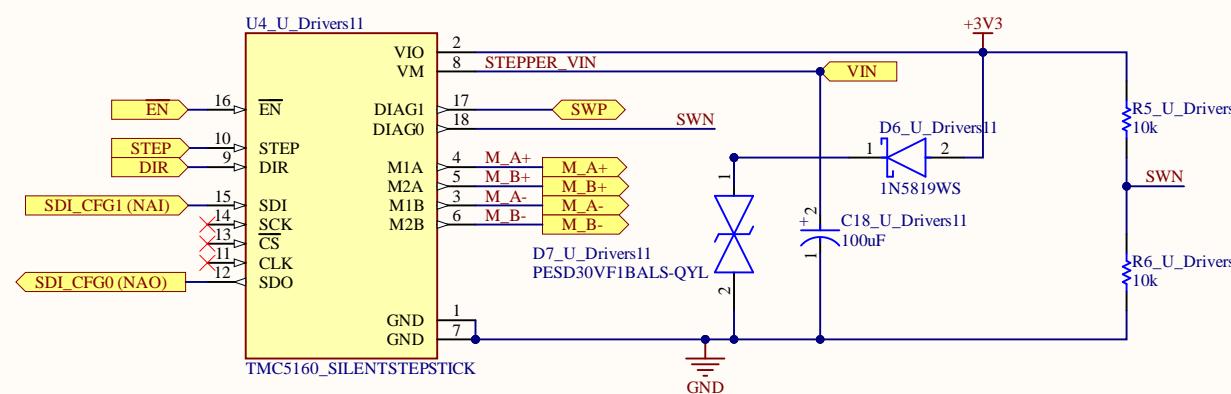
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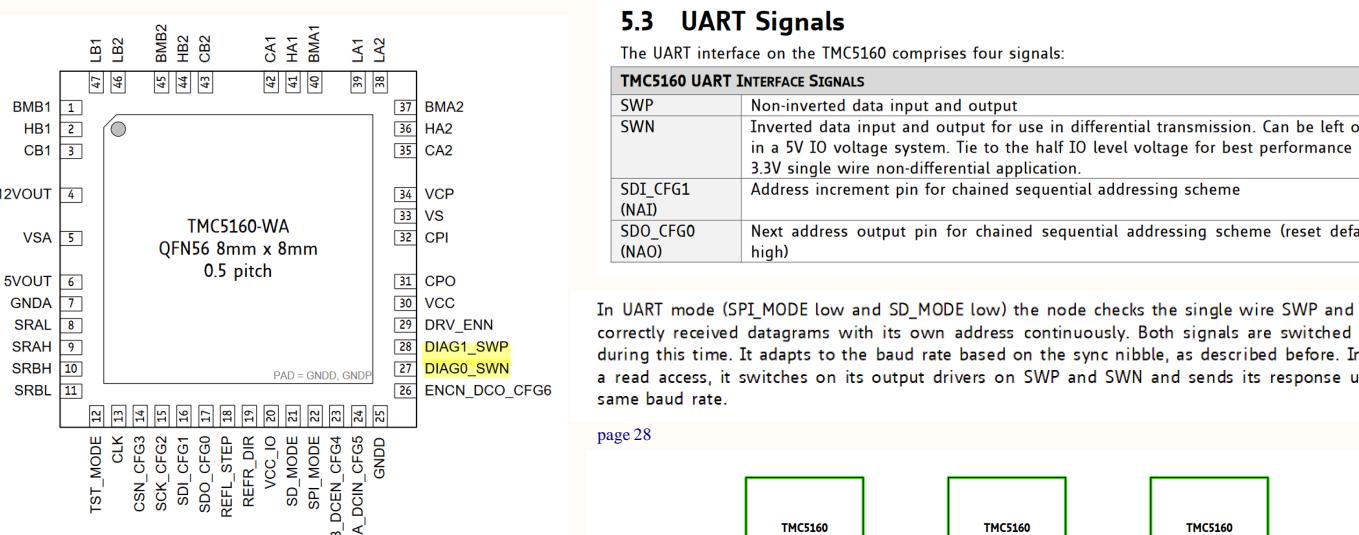
silentstepstick protector schematic

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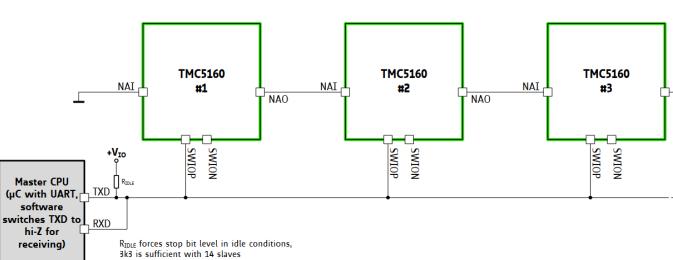


A Addressing multiple slaves with UART mode

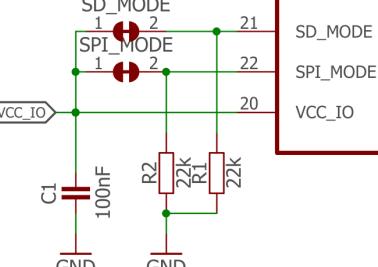
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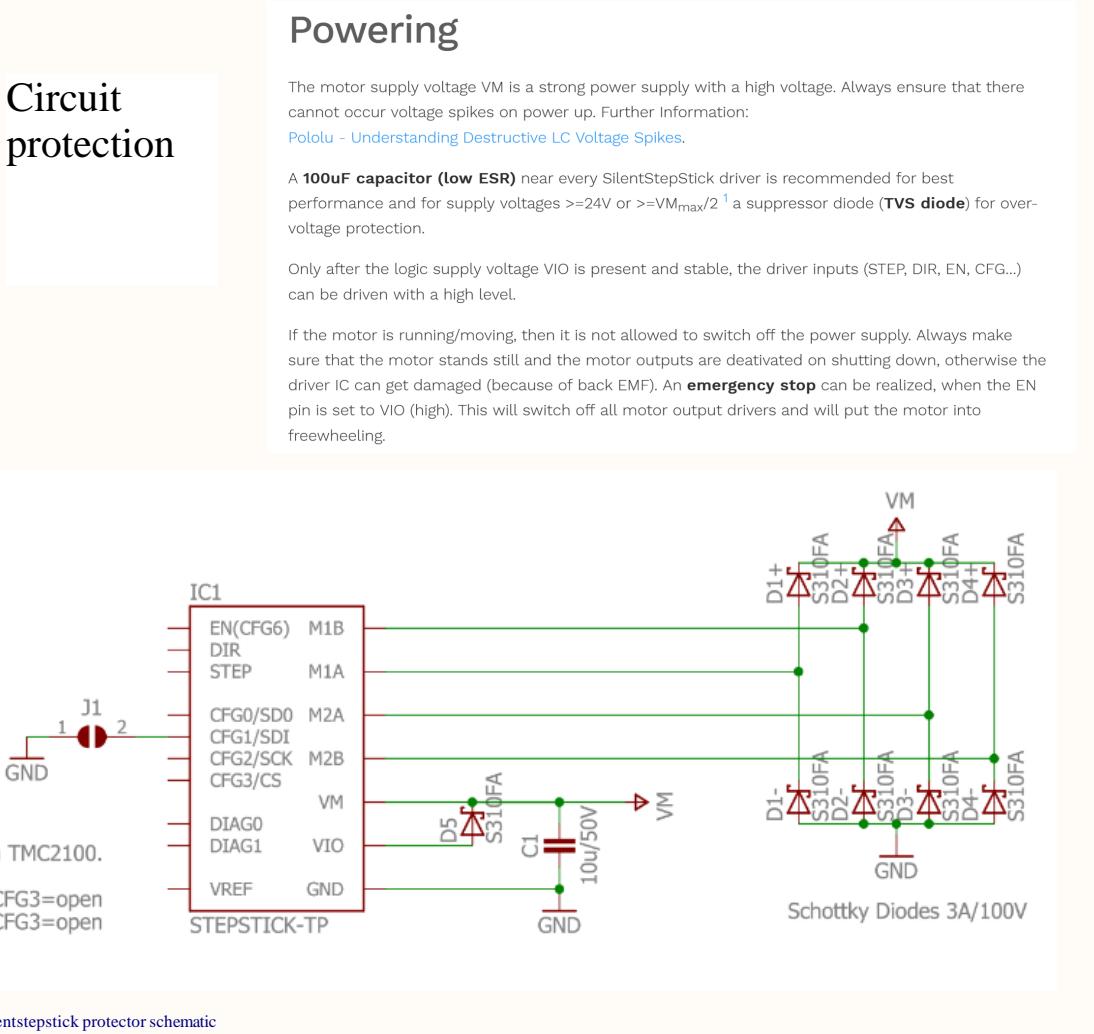


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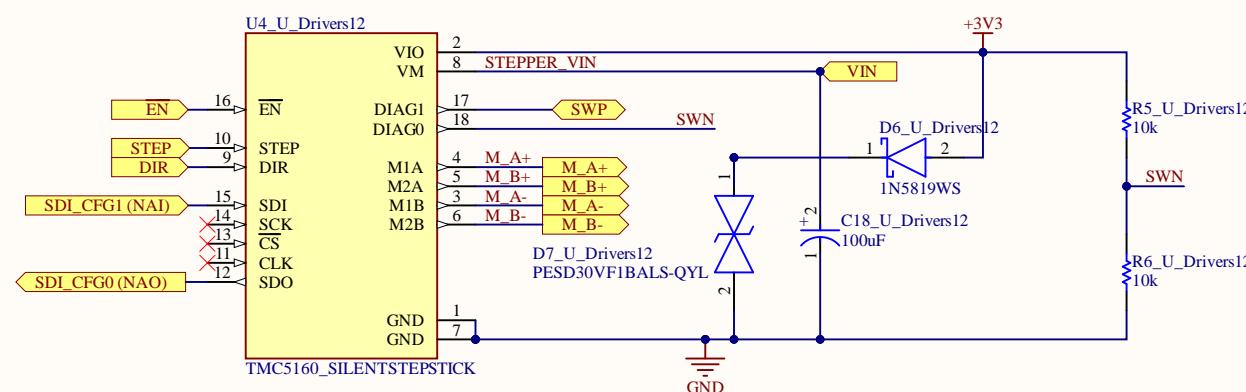
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)



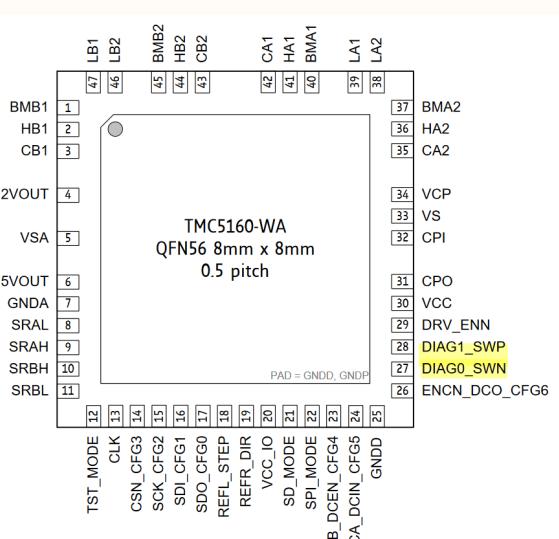
silentstepstick protector schematic

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A Addressing multiple slaves with UART mode

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5.3 UART Signals

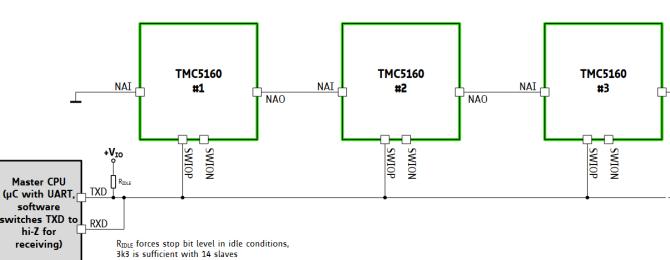
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TMC5160 UART INTERFACE SIGNALS

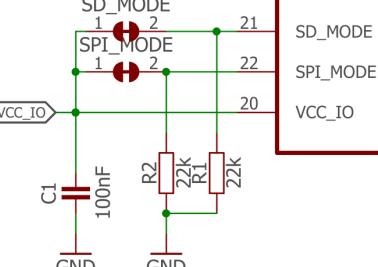
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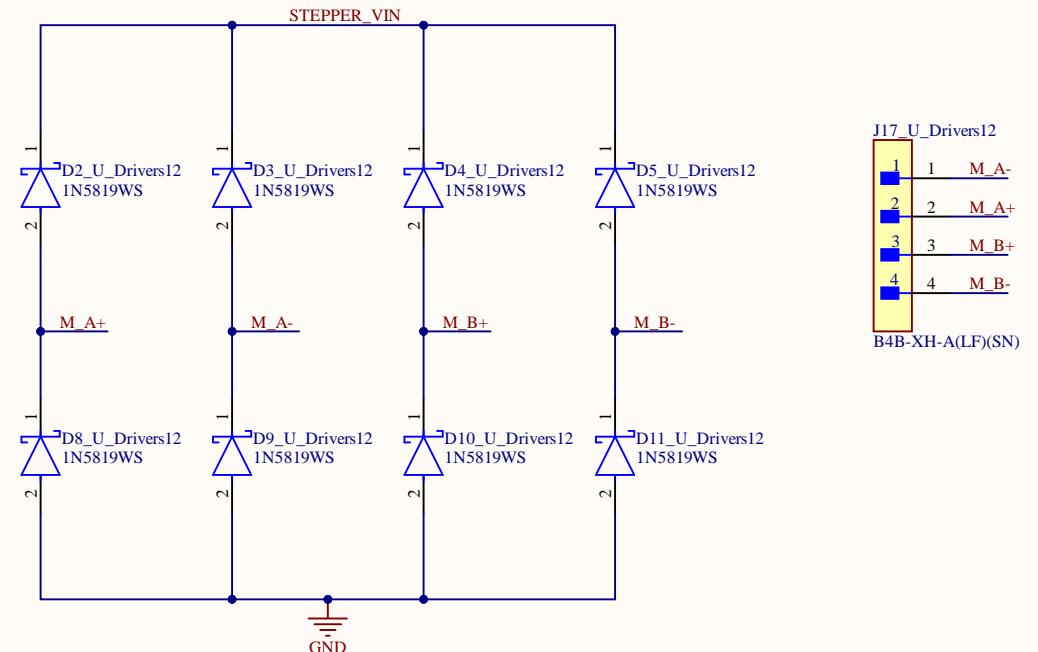
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)



B Powering

Circuit protection

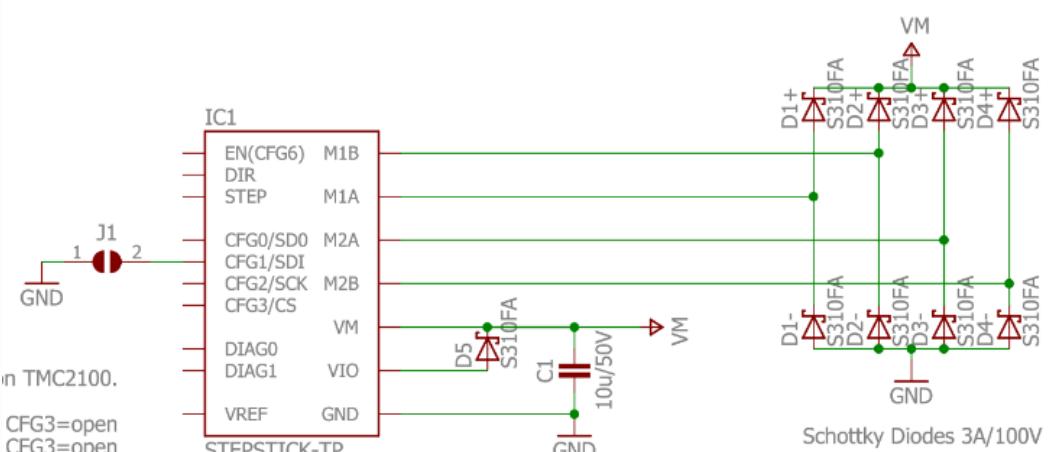
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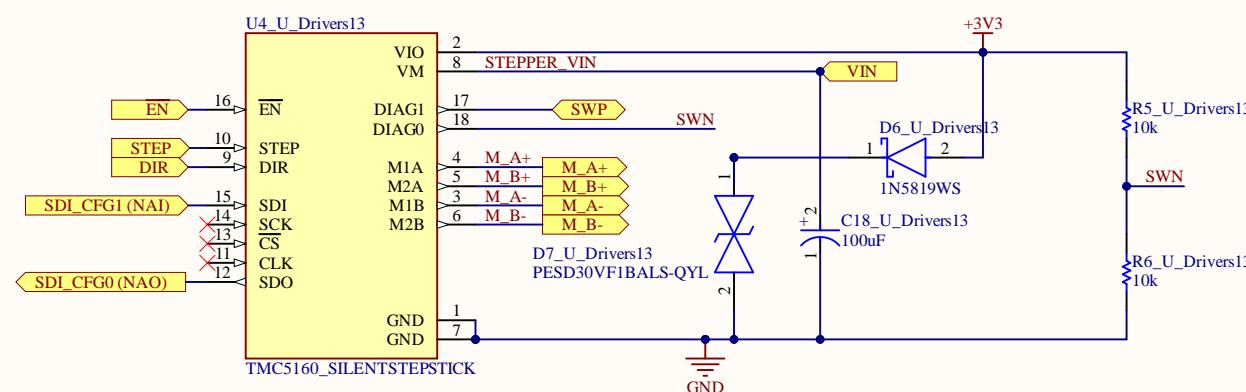
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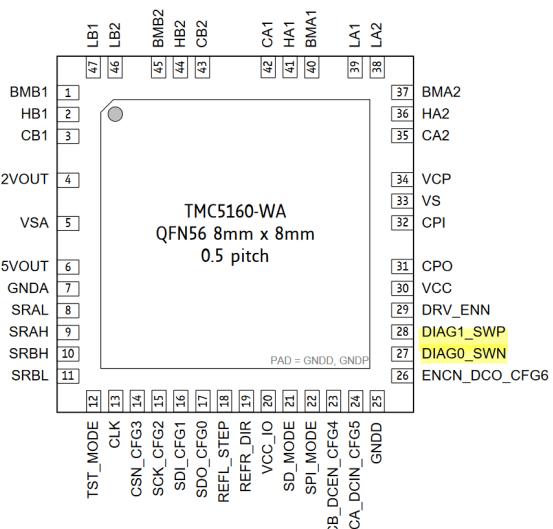
silentstepstick protector schematic

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A Addressing multiple slaves with UART mode

https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



5.3 UART Signals

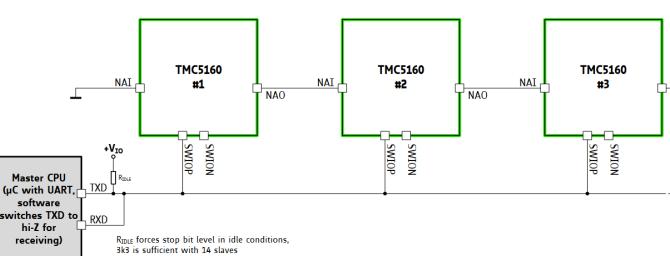
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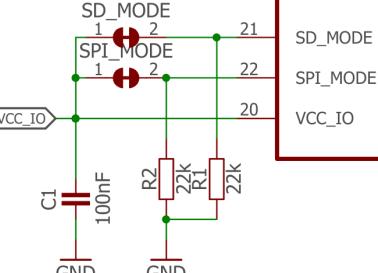
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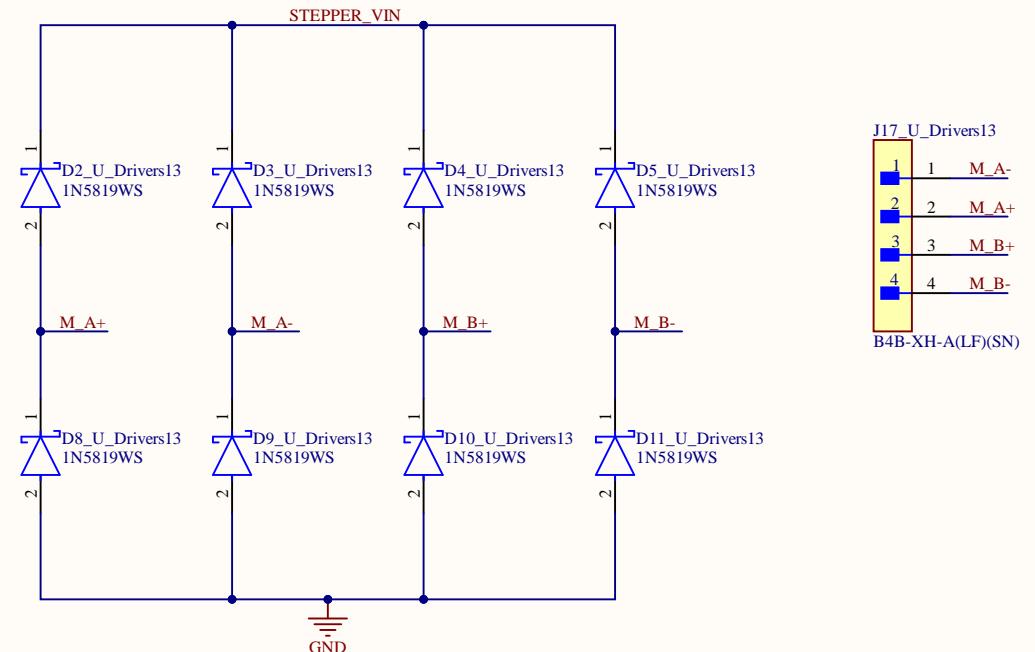
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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)



B Powering

Circuit protection

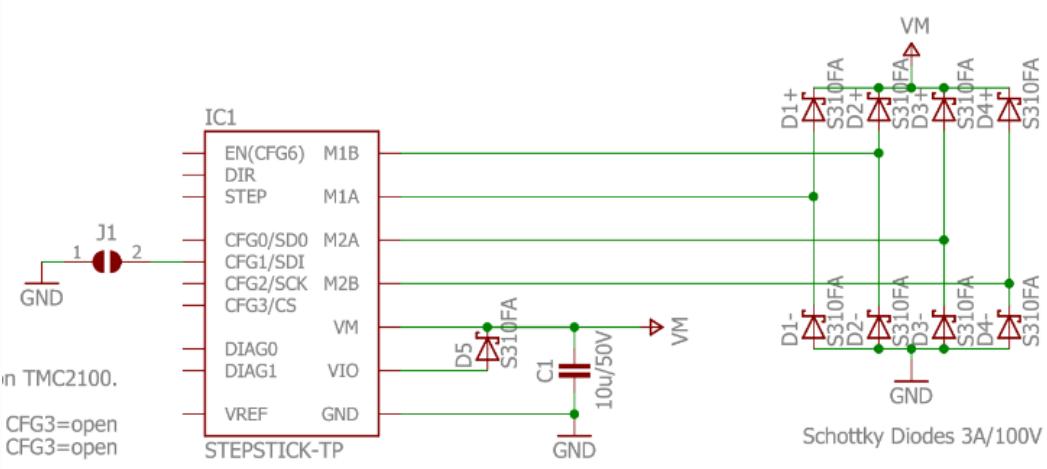
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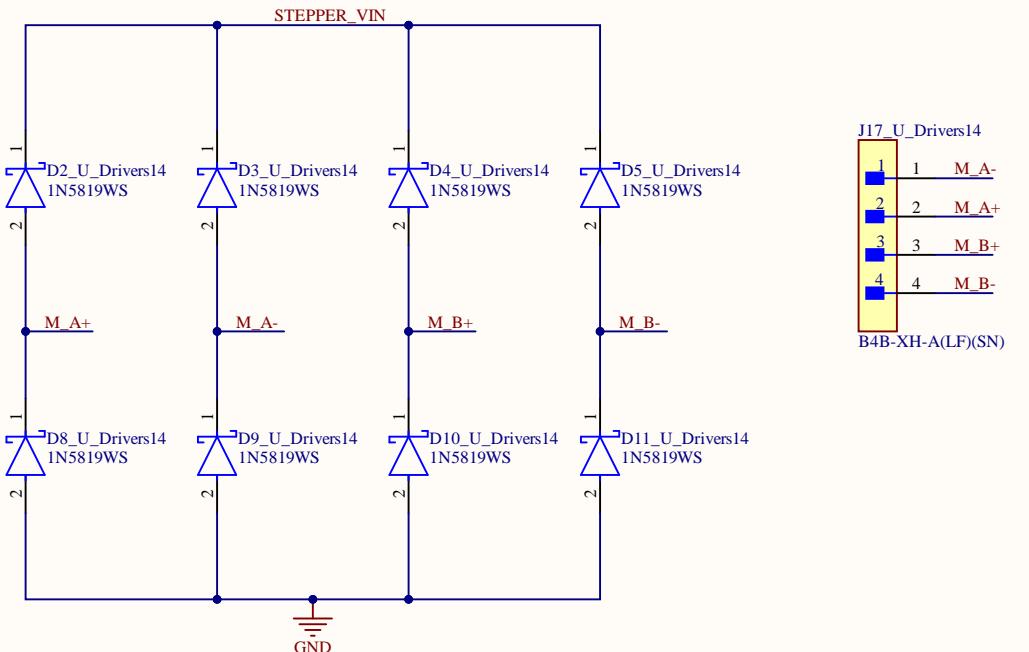
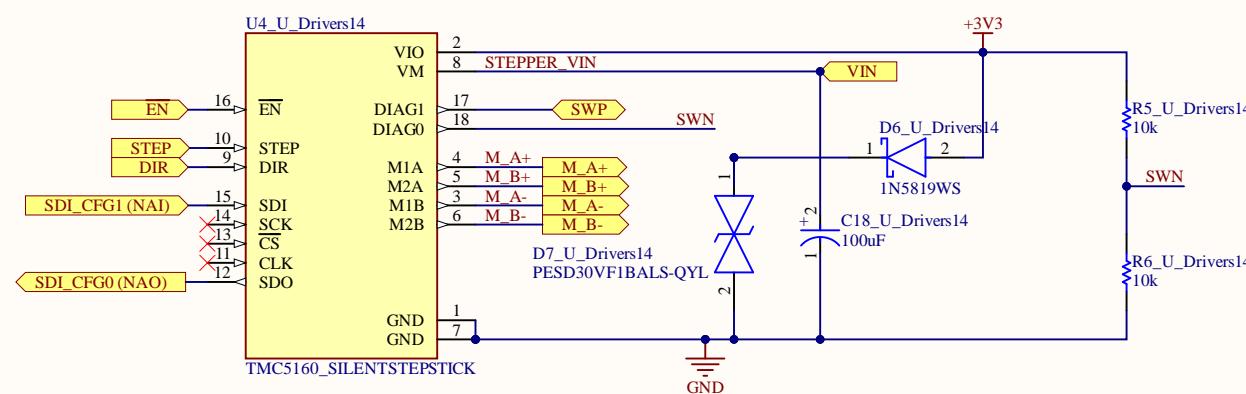
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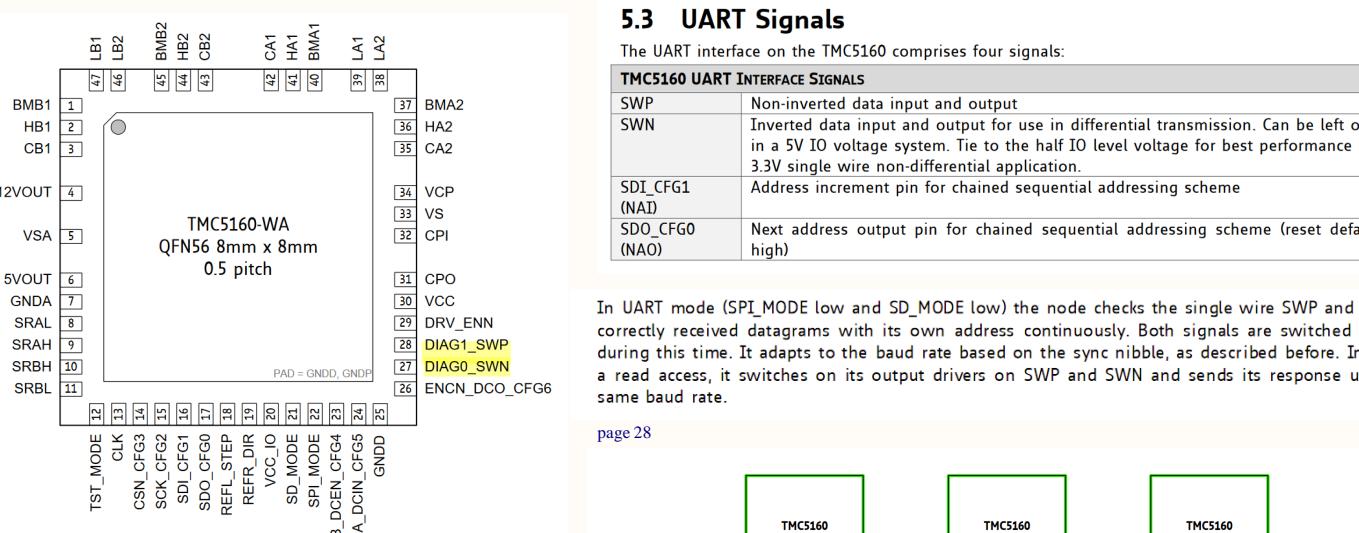
silentstepstick protector schematic

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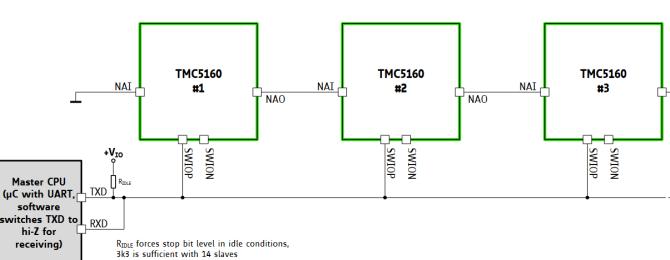


A Addressing multiple slaves with UART mode

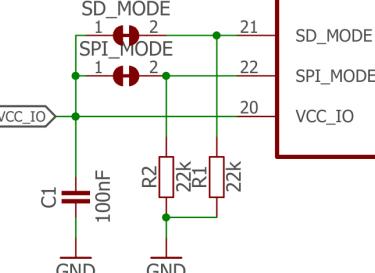
https://www.analog.com/media/en/technical-documentation/data-sheets/TMC5160A_datasheet_rev1.17.pdf



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SD_MODE and SPI_MODE jumpers must be cut to enable UART mode (schematic from TMC5160 github)

B Powering

Circuit protection

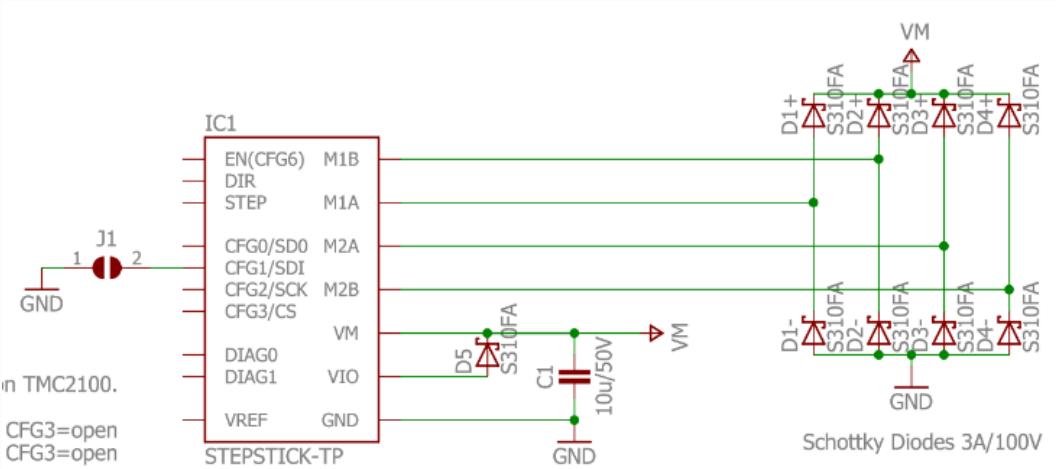
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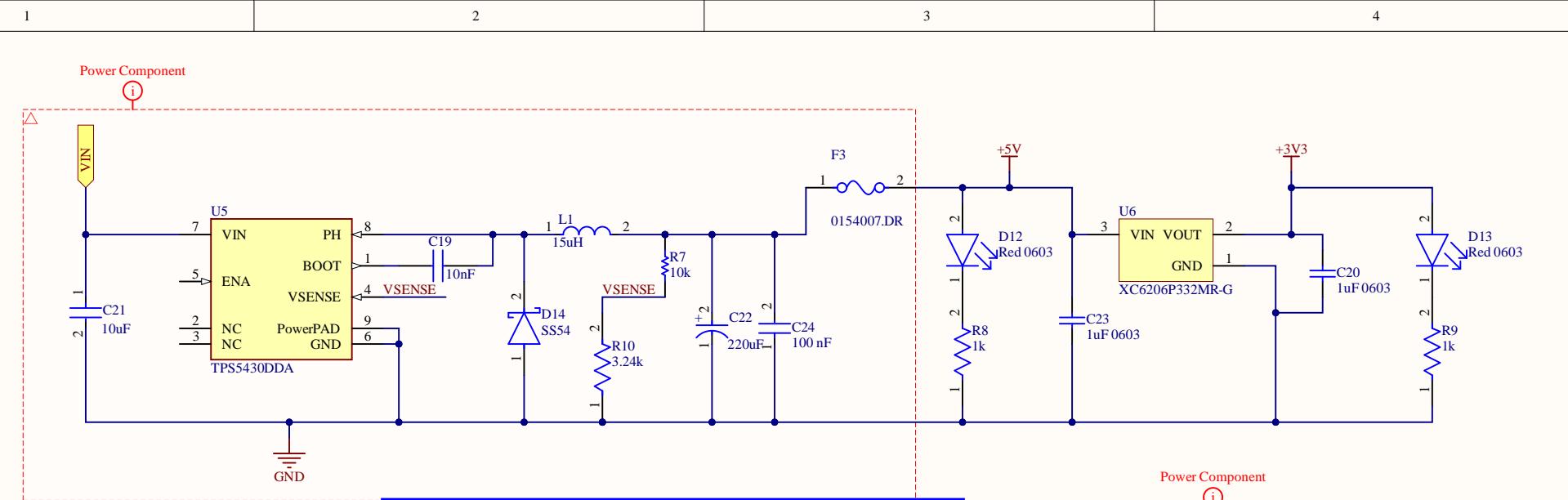
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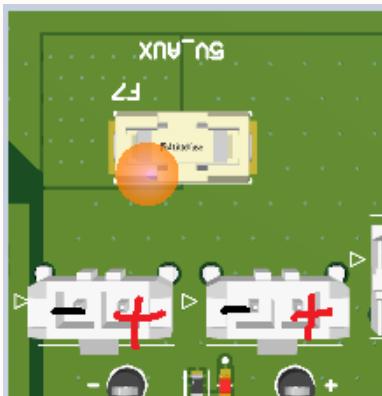


silentstepstick protector schematic

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Date: 12/10/2024	Sheet of	
File: Drivers.SchDoc	Drawn By:	



Connector standard for power (clip side -> GND)



Schematic + layout references

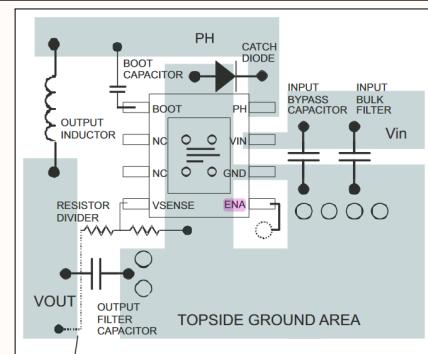
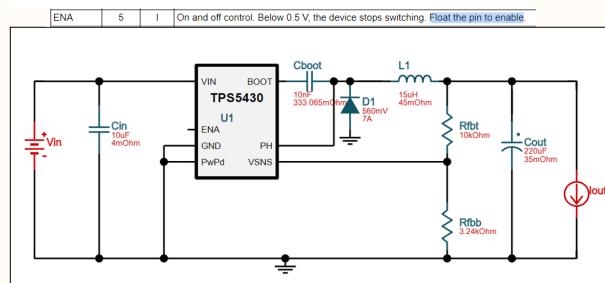
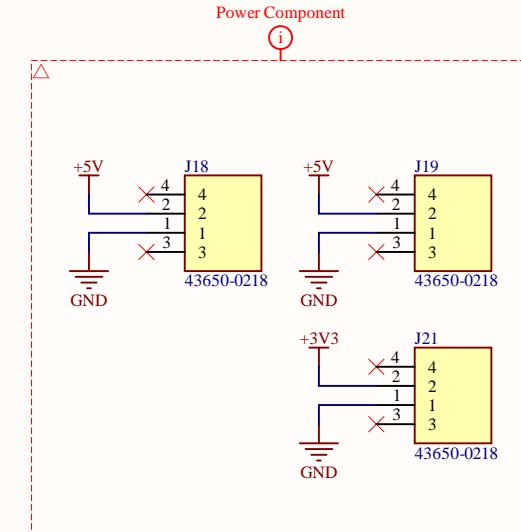


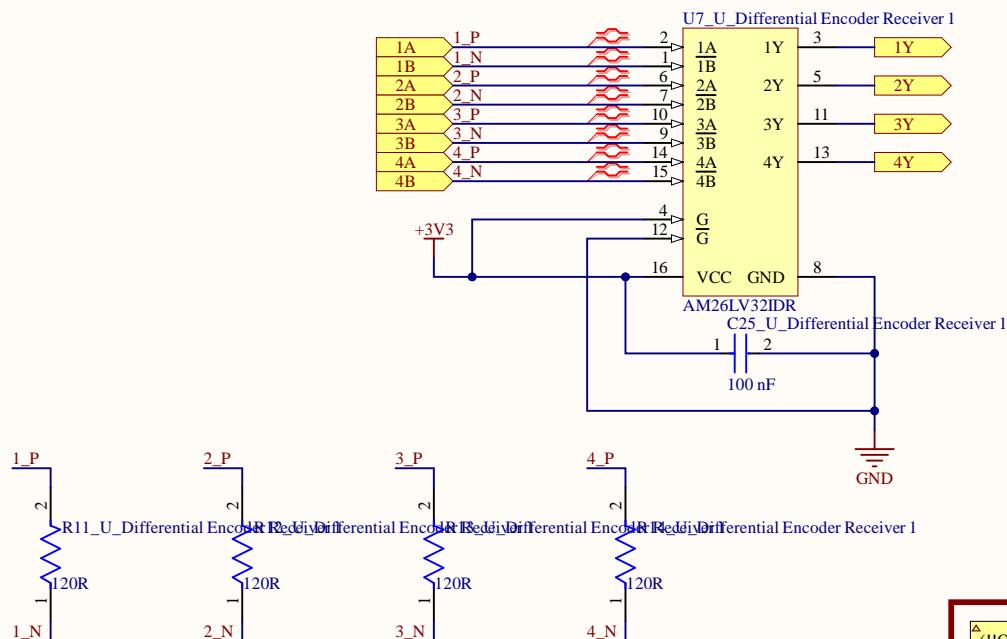
Figure 7-12. Design Layout



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Date: 12/10/2024		Sheet of
File: Power.SchDoc		Drawn By:

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► Might have to change all the terminating resistors to 1k ohms - No data on the stepper motor's website.

<https://www.quantumdev.com/how-to-use-termination-resistors-when-installing-rotary-incremental-encoders/>

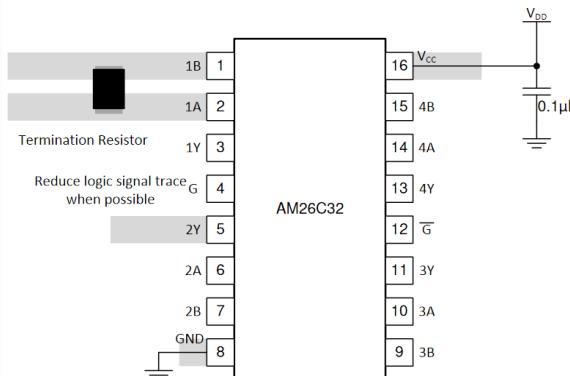


Figure 8-3. Trace Layout on PCB and Recommendations

⚠ (!!!OLD!!) Change to Low Voltage version now (it was AM26C32IDR)

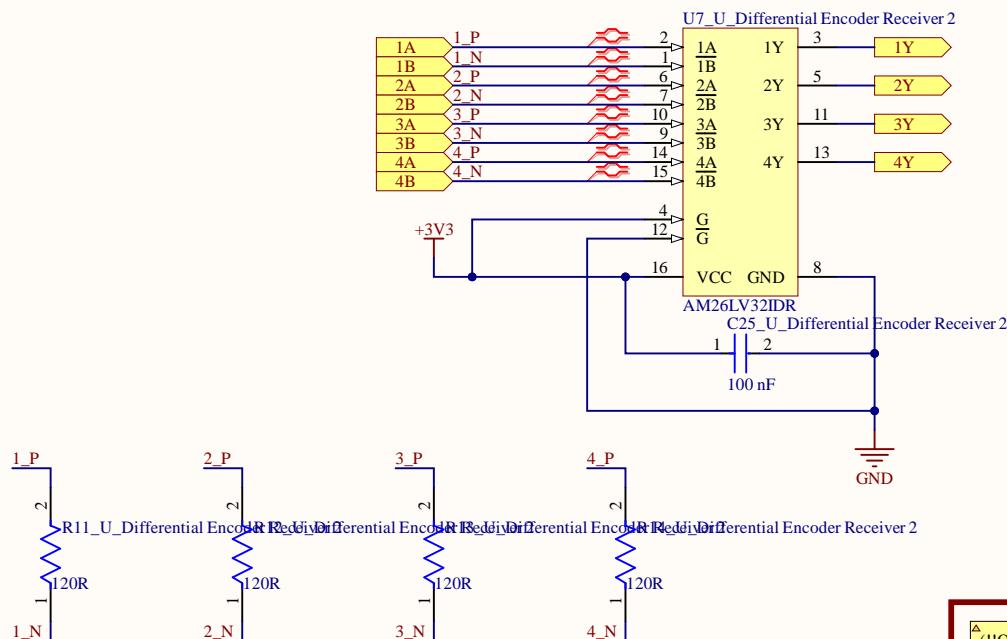
7.3.3 Active-High and Active-Low

The device can be configured using the G and \overline{G} logic inputs to select receiver output. The high voltage or logic 1 on the G pin, allows the device to operate on an active-high and having a low voltage or logic 0 on the \overline{G} enables active low operation. These are simply a way to configure the logic to match that of the receiving or transmitting controller or microprocessor.

△ G is Active Low config
Output is pulled up to 3v3
to interface with STM32

Title		
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Date:	12/10/2024	Sheet of
File:	Differential Encoder Receiver SchDoc	Drawn By:

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Might have to change all the terminating resistors to 1k ohms - No data on the stepper motor's website.
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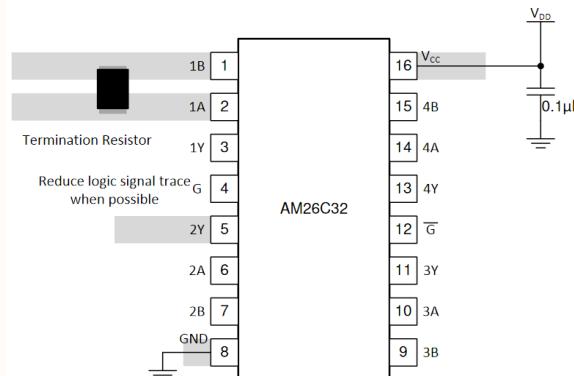


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7.3.3 Active-High and Active-Low

The device can be configured using the G and \overline{G} logic inputs to select receiver output. The high voltage or logic 1 on the G pin, allows the device to operate on an active-high and having a low voltage or logic 0 on the \overline{G} enables active low operation. These are simply a way to configure the logic to match that of the receiving or transmitting controller or microprocessor.

[△] G is Active Low config
Output is pulled up to 3v3 to interface with STM32

Title		
Size A4	Number	Revision
Date: 12/10/2024	Sheet of	
File: Differential Encoder Receiver.SchDoc	Drawn By:	

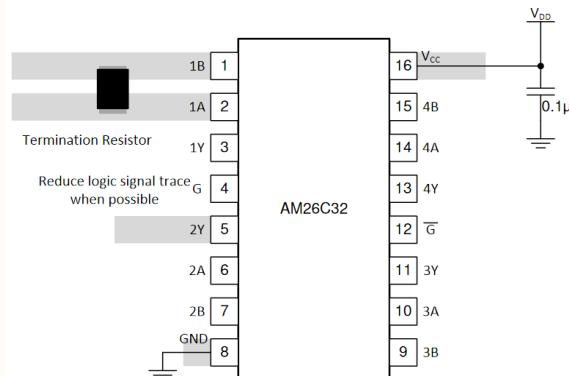
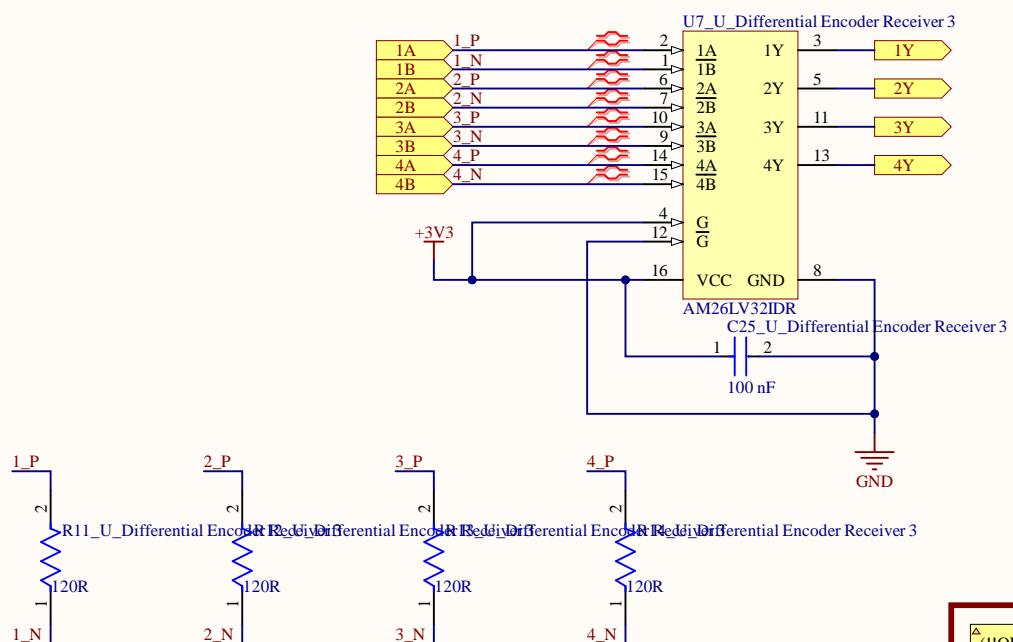


Figure 8-3. Trace Layout on PCB and Recommendations

Might have to change all the terminating resistors to 1k ohms - No data on the stepper motor's website.

<https://www.quantumdev.com/how-to-use-termination-resistors-when-installing-rotary-incremental-encoders/>

(!!!OLD!!) Change to Low Voltage version now (it was AM26C32IDR)

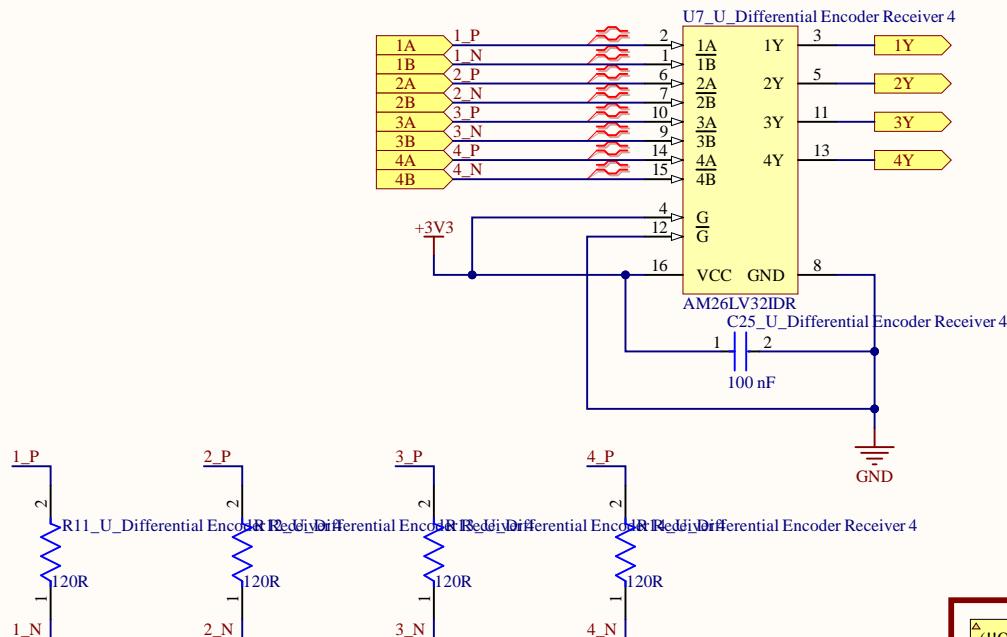
7.3.3 Active-High and Active-Low

The device can be configured using the G and G-bar logic inputs to select receiver output. The high voltage or logic 1 on the G pin, allows the device to operate on an active-high and having a low voltage or logic 0 on the G-bar enables active low operation. These are simply a way to configure the logic to match that of the receiving or transmitting controller or microprocessor.

G is Active Low config
Output is pulled up to 3v3 to interface with STM32

Title		
Size A4	Number	Revision
Date: 12/10/2024	Sheet of	
File: Differential Encoder Receiver.SchDoc	Drawn By:	

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Might have to change all the terminating resistors to 1k ohms - No data on the stepper motor's website.
<https://www.quantumdev.com/how-to-use-termination-resistors-when-installing-rotary-incremental-encoders/>

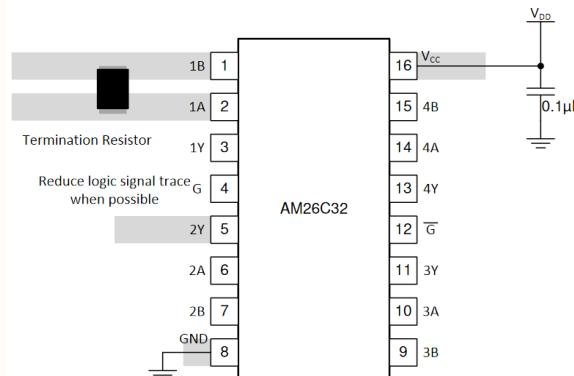


Figure 8-3. Trace Layout on PCB and Recommendations

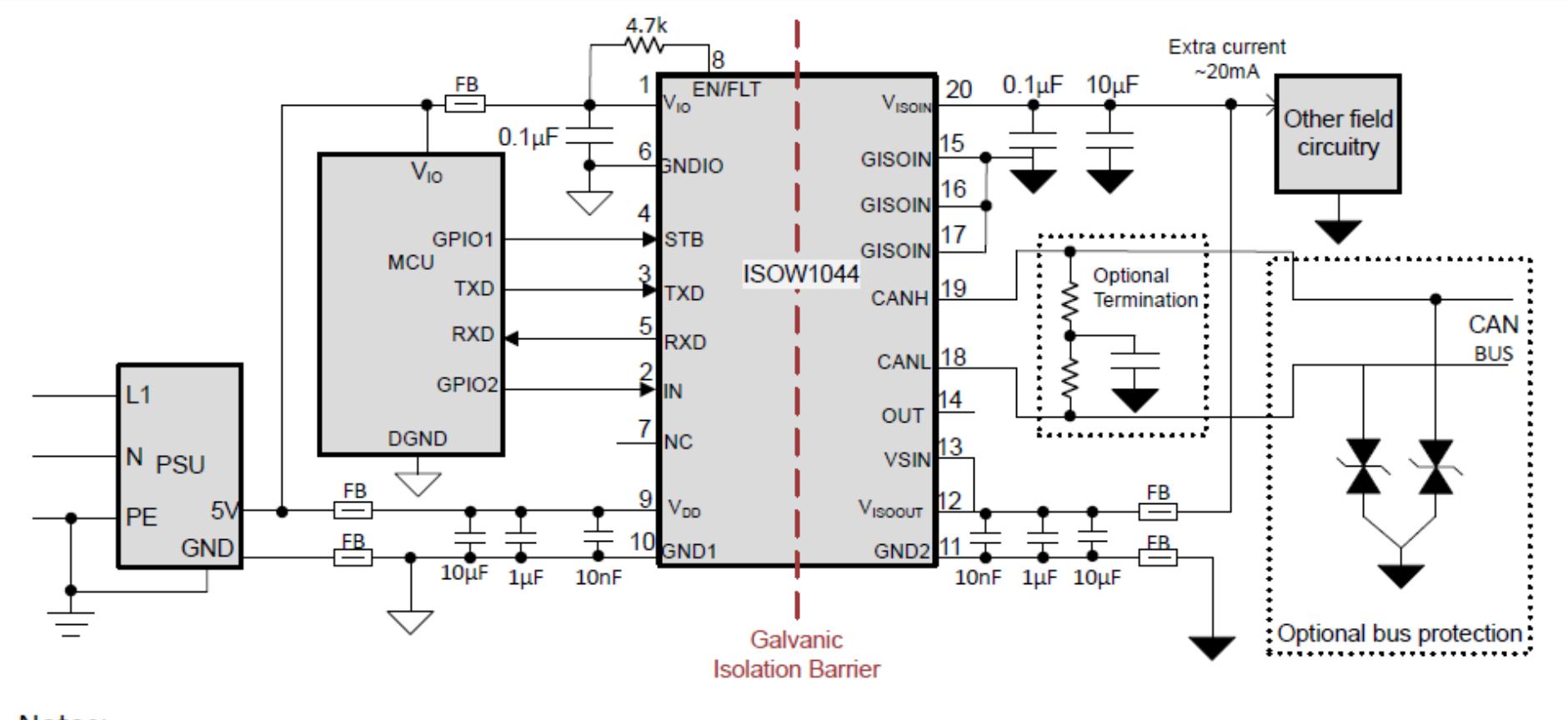
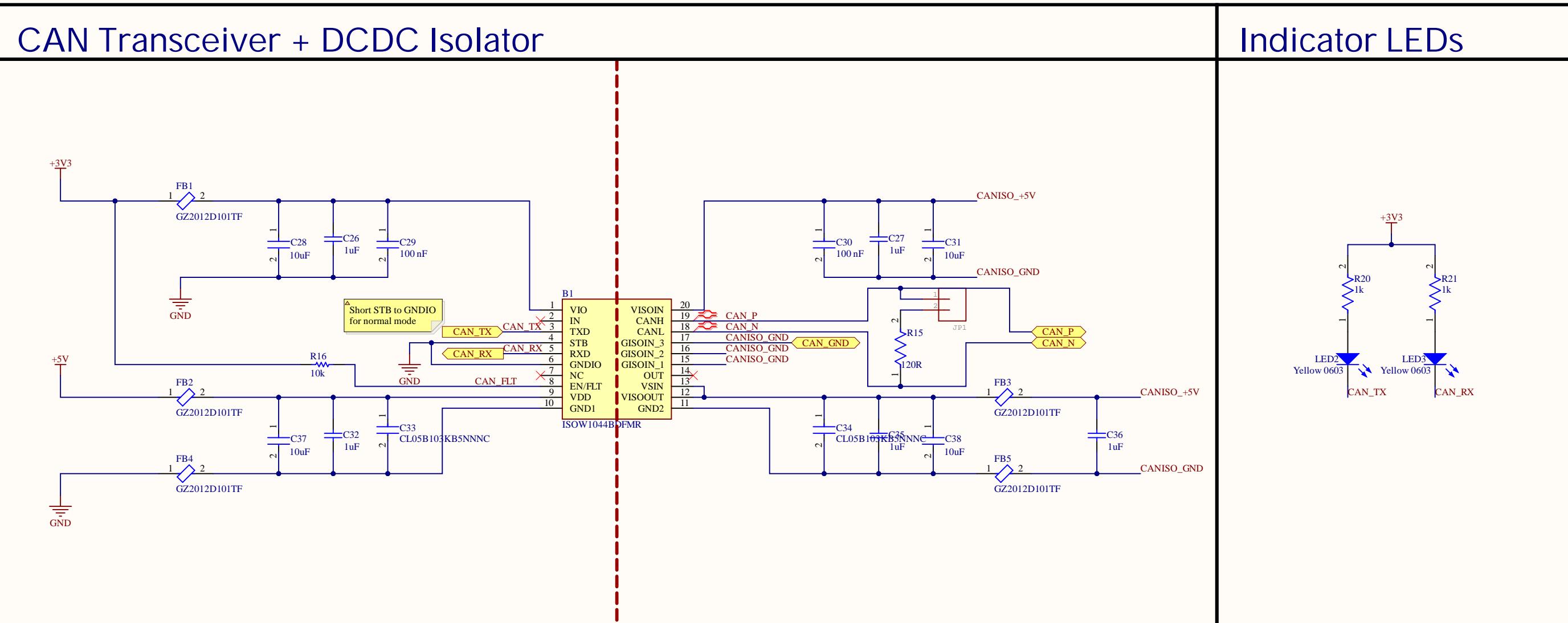
(!!!OLD!!) Change to Low Voltage version now (it was AM26C32IDR)

7.3.3 Active-High and Active-Low

The device can be configured using the G and \overline{G} logic inputs to select receiver output. The high voltage or logic 1 on the G pin, allows the device to operate on an active-high and having a low voltage or logic 0 on the \overline{G} enables active low operation. These are simply a way to configure the logic to match that of the receiving or transmitting controller or microprocessor.

G is Active Low config
Output is pulled up to 3v3 to interface with STM32

Title		
Size A4	Number	Revision
Date: 12/10/2024	Sheet of	
File: Differential Encoder Receiver.SchDoc	Drawn By:	



Title		
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Date: 12/10/2024 File: ISO_CAN.SchDoc	Sheet of 6	Drawn By: