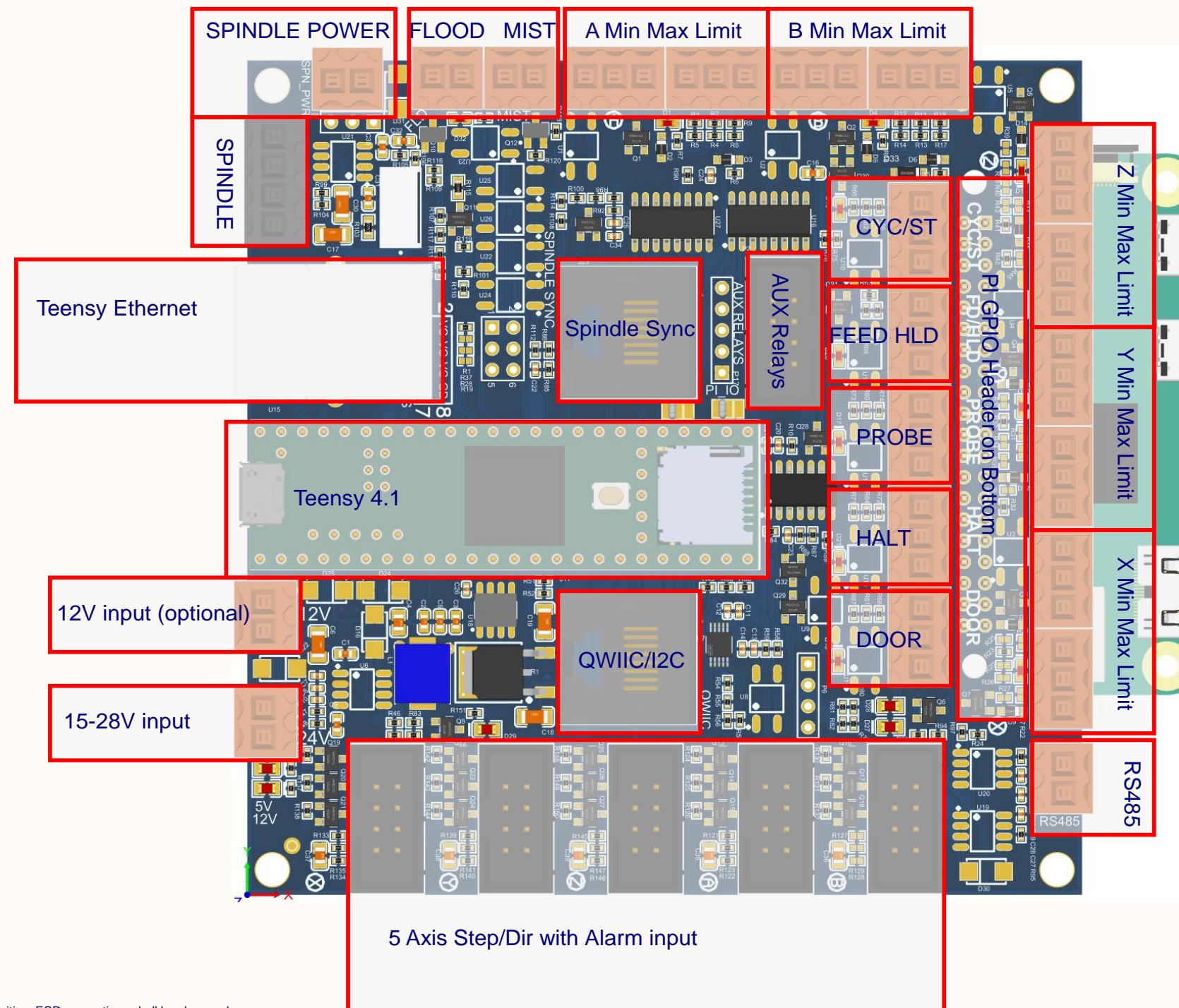


# GRBLHAL2000 Breakout



**ZZ1**  
Assembly Note  
These assemblies are ESD sensitive, ESD precautions shall be observed.

**ZZ2**  
Assembly Note  
These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.

**ZZ3**  
Assembly Note  
These assemblies must comply with workmanship standards IPC-A-610 Class 2, unless otherwise specified.

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Title Sheet		
PROJECT	REV	
PrintNC_GRBLHAL_BreakoutAProjPCB		
ENGR	DOCUMENT	
AM	Title Sheet.SchDoc	
SIZE	MODIFIED	SHEET
B	2021-06-08 3:21:08 PM	1 / 14

## Top Level Design

A

U\_PrintNC\_BREAKOUT  
PrintNC\_CNC\_Breakout.SchDoc



B

A

C

B

D

C

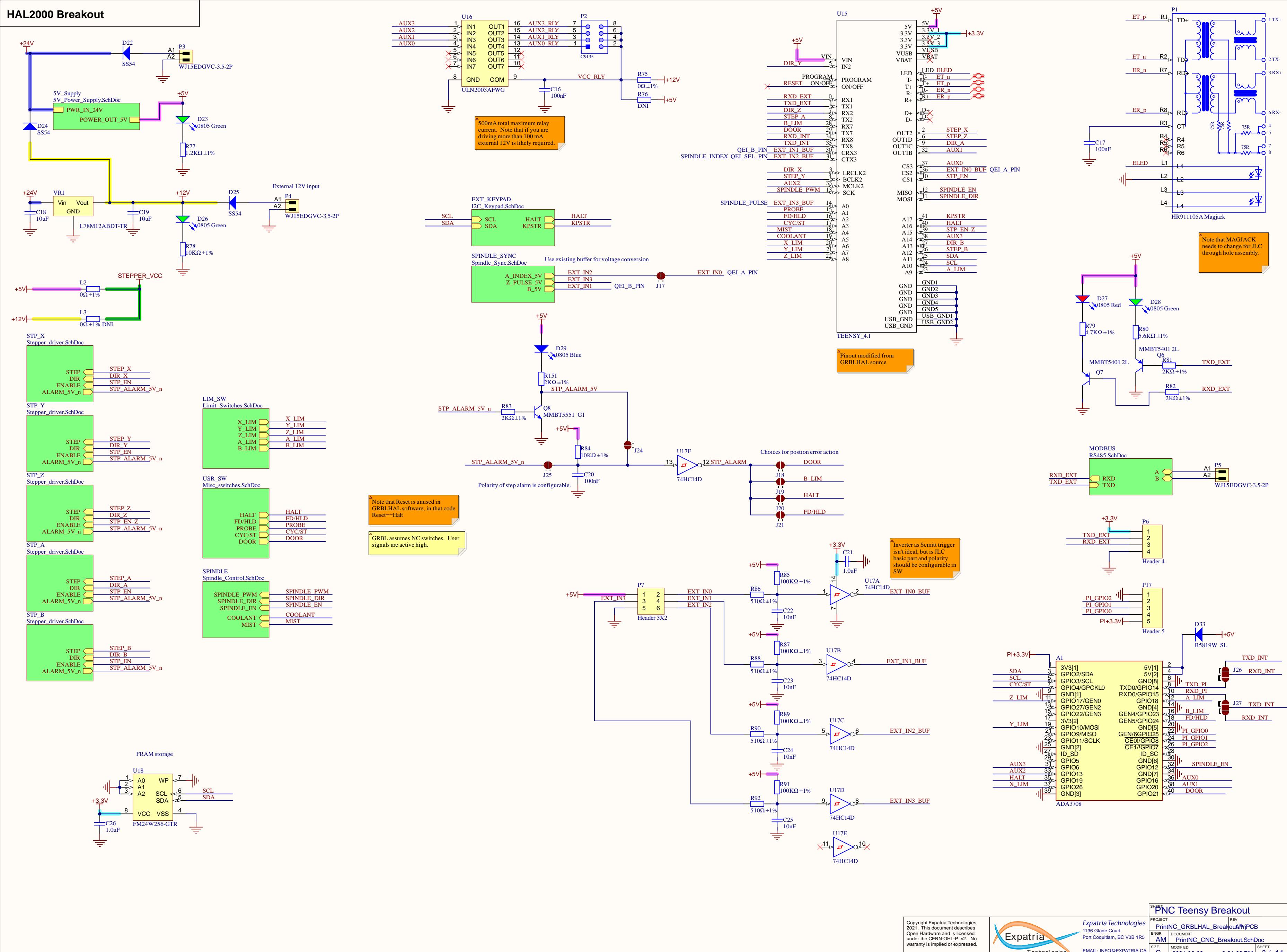
D

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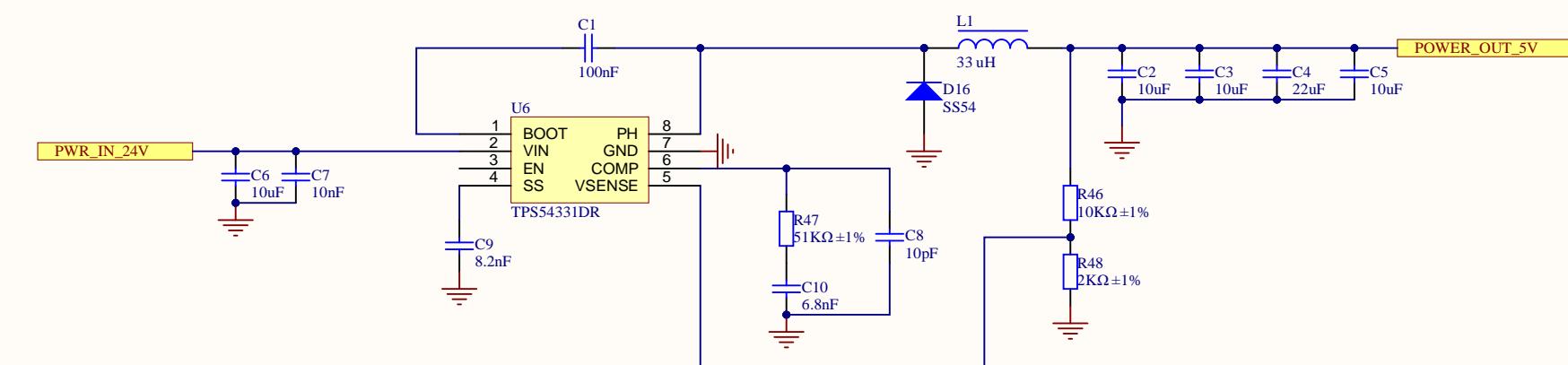


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SHEET		Top Level Design	
PROJECT	REV		
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AM	Top Level.SchDoc		
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# 5V Power Supply



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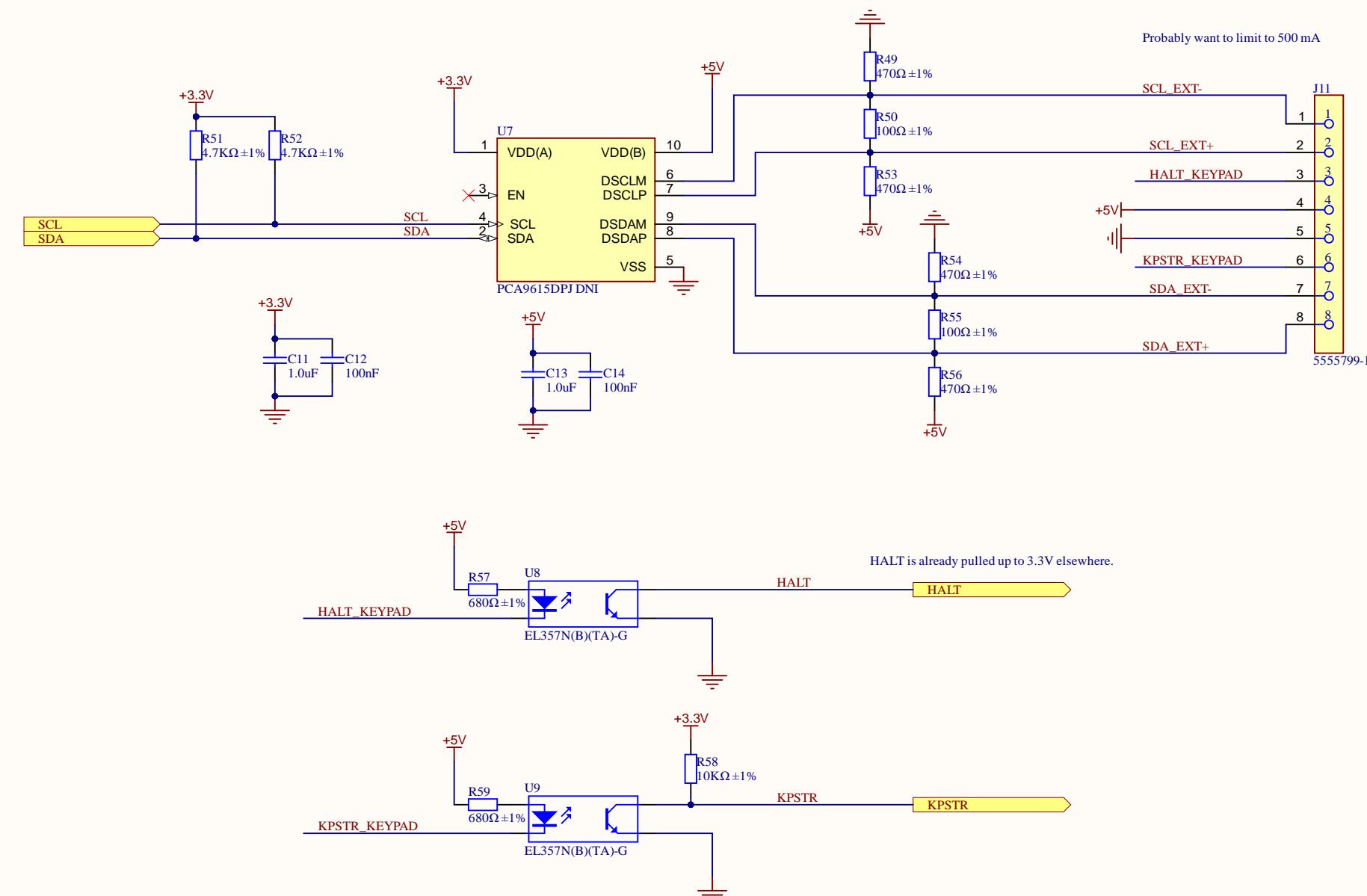
Expatria Technologies  
PrintNC\_GRBLHAL\_BreakoutPrjPCB  
AM 5V\_Power\_Supply.SchDoc  
EMAIL: INFO@EXPATRIA.CA

SHEET 5V power regulator	
PROJECT	REV
ENGR	DOCUMENT
PrintNC_GRBLHAL_BreakoutPrjPCB	
AM	5V_Power_Supply.SchDoc
SIZE B	MODIFIED 2021-06-08 3:21:08 PM
	SHEET 4 / 14

# QWIIC I2C Keypad



This should be a QWIIC compatible endpoint but adds KPSTR and HALT to the RJ45. All appropriate credit to Sparkfun for QWIIC.



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AM I2C\_Keypad.SchDoc  
EMAIL: INFO@EXPATRIA.CA

SHEET		QWIIC I2C Keypad	
PROJECT	REV	DOCUMENT	FILE
PrintNC_GRBLHAL_BreakoutPrjPCB			
AM		I2C_Keypad.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:08 PM	SHEET 13	14

# Limit Switches

A

A

B

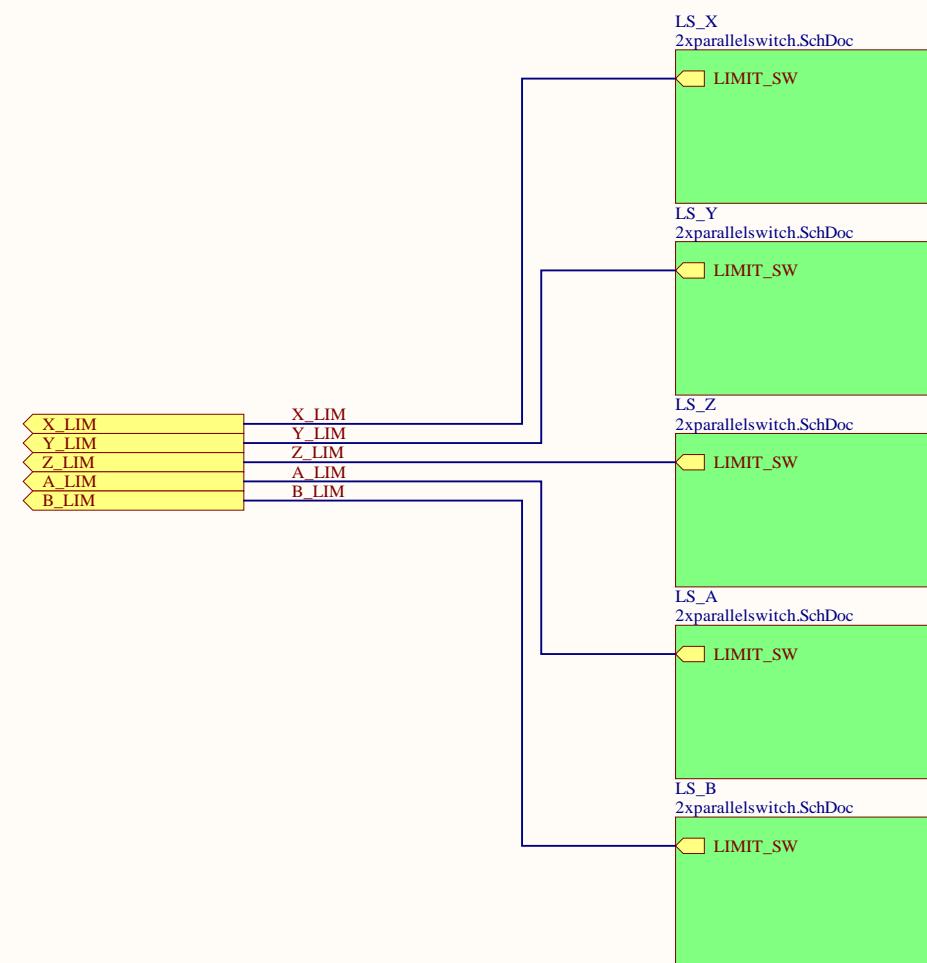
B

C

C

D

D



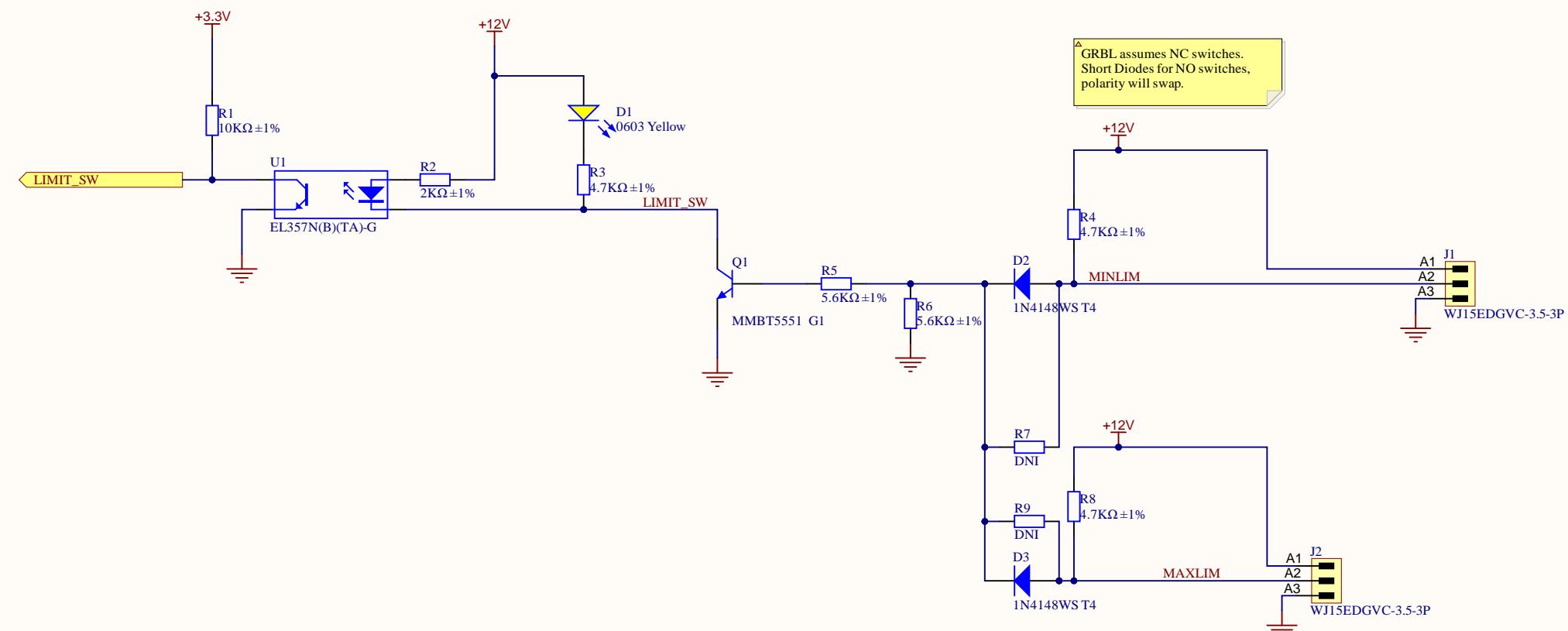
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SHEET		Limit Switches	
PROJECT	REV		
ENGR	DOCUMENT		
AM	Limit_Switches.SchDoc		
SIZE B	MODIFIED 2021-06-08 3:21:08 PM	SHEET 5 / 14	

# Limit Switch OR



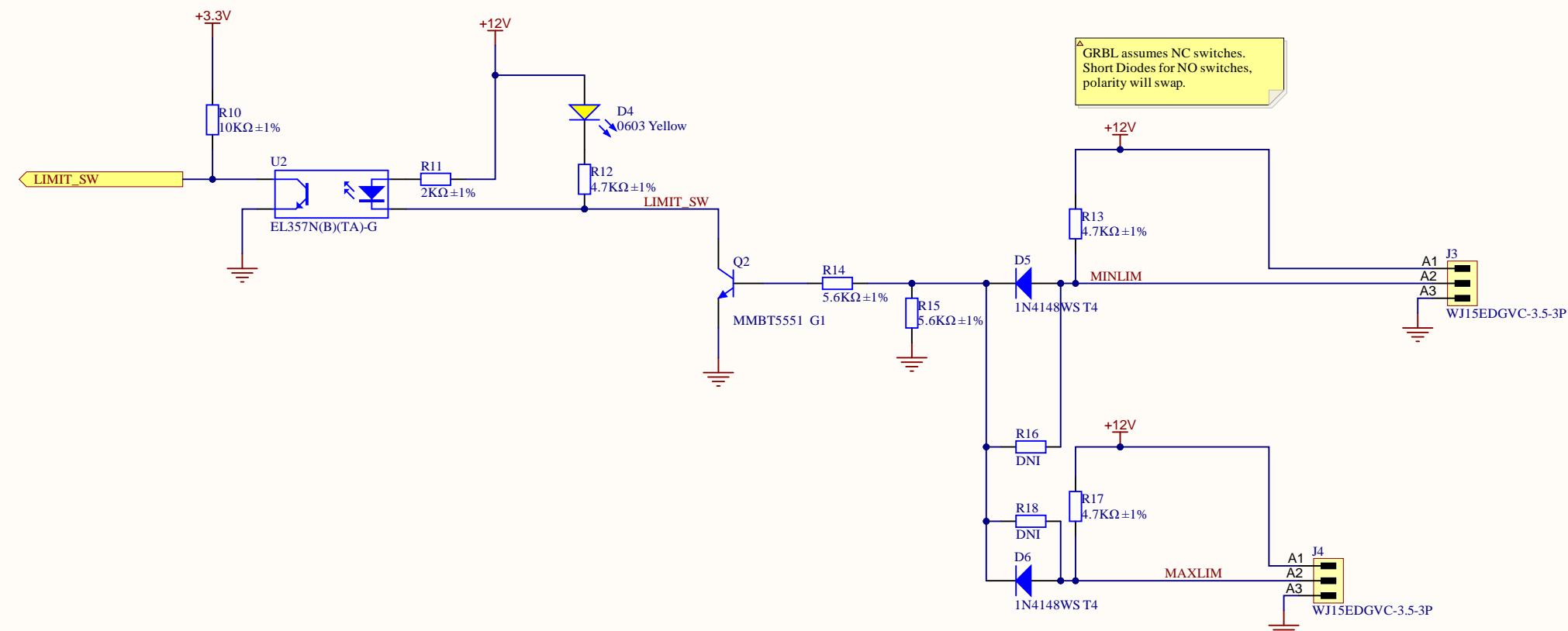
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PROJECT	REV	DOCUMENT	FILE
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AM			
2xparallelswitch.SchDoc			
EMAIL: INFO@EXPATRIA.CA			
SHEET		MODIFIED	6 / 14
B		2021-06-08 3:21:08 PM	

# Limit Switch OR



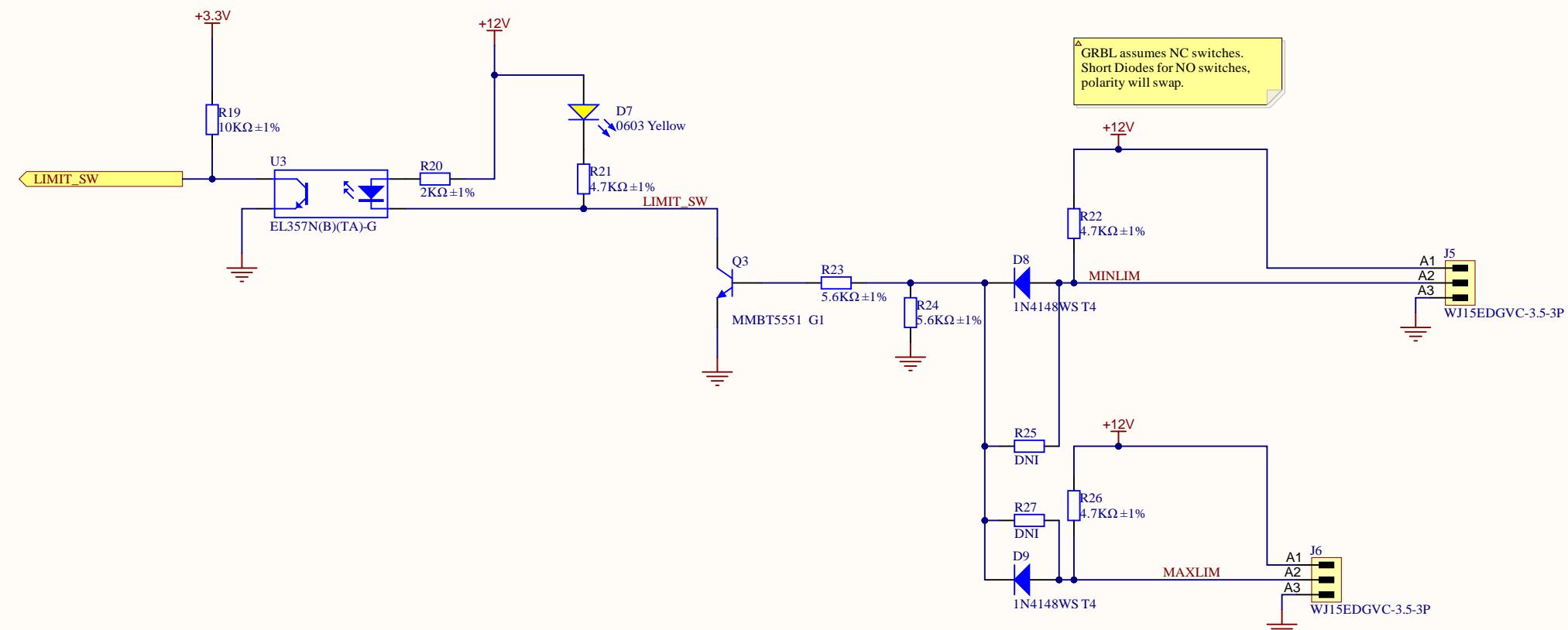
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PROJECT	REV	DOCUMENT	
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ENGR	DOCUMENT		
SIZE	MODIFIED		SHEET
B	2021-06-08 3:21:09 PM		6 / 14

# Limit Switch OR



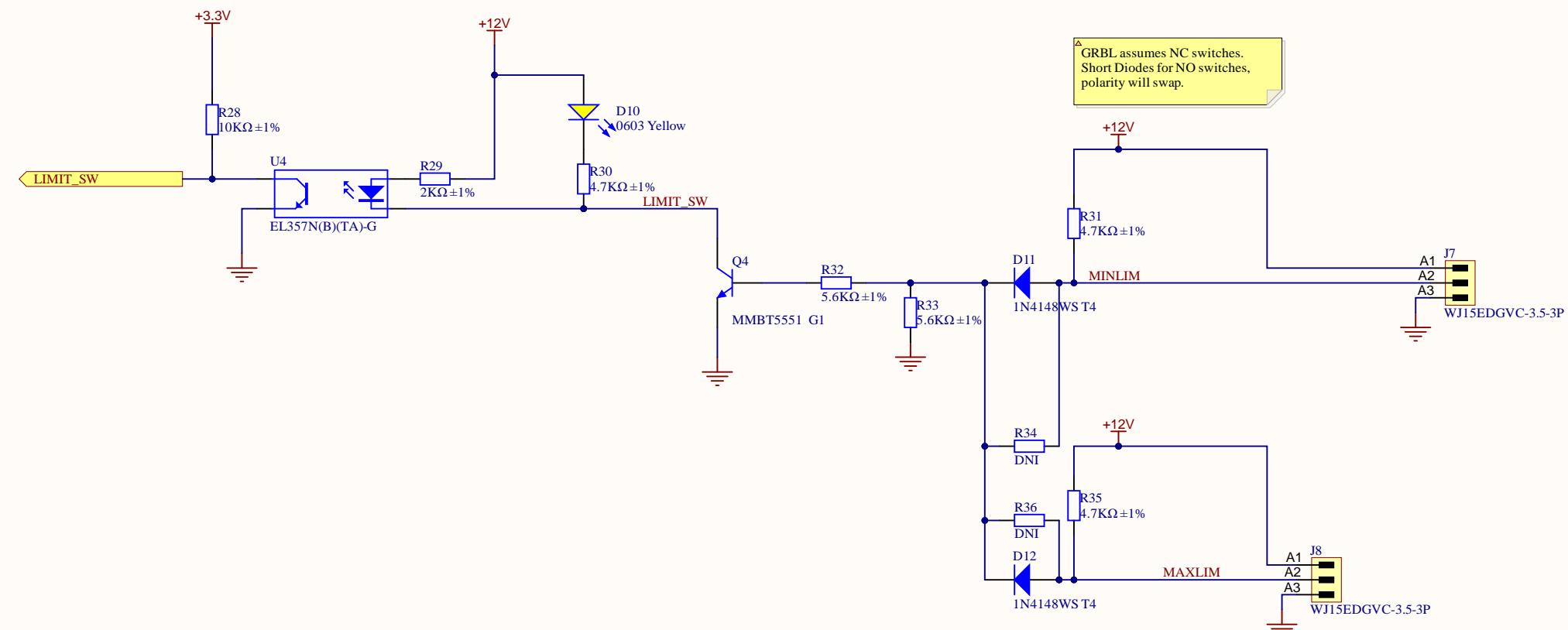
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SHEET		Limit Switch OR	
PROJECT	REV	DOCUMENT	
PrintNC_GRBLHAL_BreakoutPrjPCB		AM 2xparallelswitch.SchDoc	
ENGR	DOCUMENT		
SIZE	MODIFIED		
B	2021-06-08 3:21:09 PM		
			SHEET
			6 / 14

# Limit Switch OR



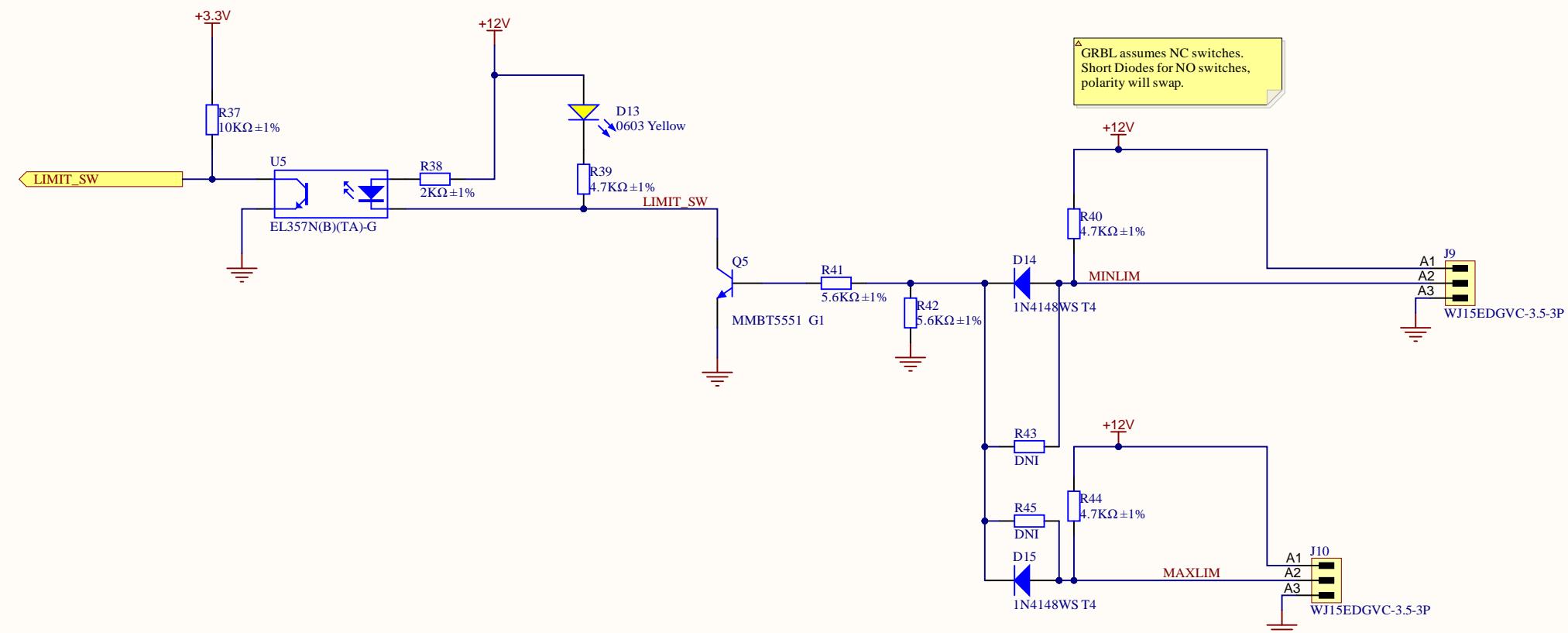
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SHEET 1 Limit Switch OR		
PROJECT	REV	
PrintNC_GRBLHAL_BreakoutPrjPCB		
ENGR	DOCUMENT	
AM	2xparallelswitch.SchDoc	
SIZE	MODIFIED	SHEET
B	2021-06-08 3:21:09 PM	6 / 14

# Limit Switch OR



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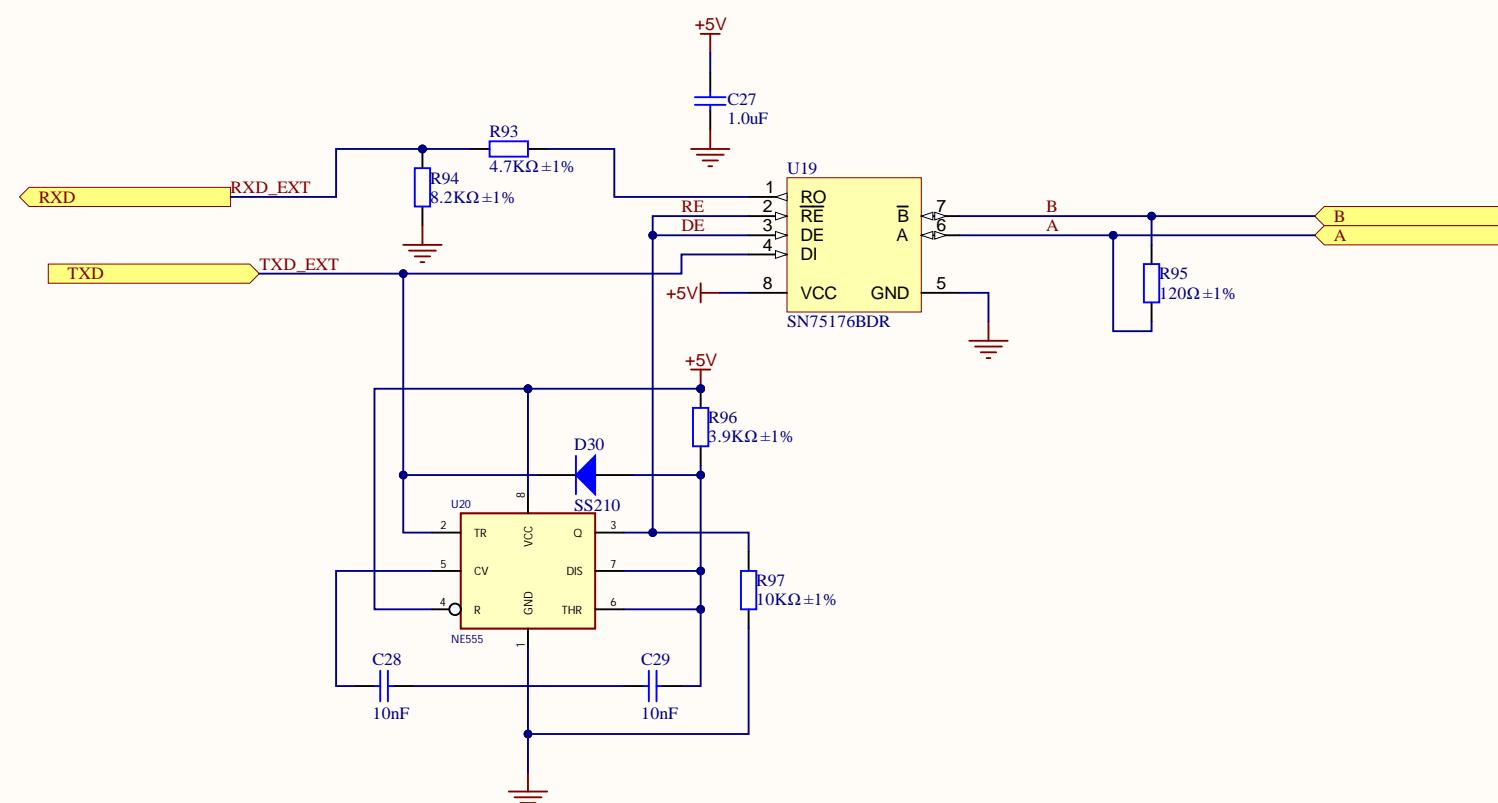


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PrintNC\_GRBLHAL\_BreakoutPrjPCB  
AM 2xparallelswitch.SchDoc  
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SHEET		Limit Switch OR	
PROJECT	REV	DOCUMENT	FILE
PrintNC_GRBLHAL_BreakoutPrjPCB			
AM			
2xparallelswitch.SchDoc			
SIZE	MODIFIED	SHEET	
B	2021-06-08 3:21:09 PM	6 / 14	

A

A



Auto direction circuit from Bryan Varner pi485 project used under MIT license. Thank you!

<https://github.com/bvarner/pi485>

B

B

C

C

D

D

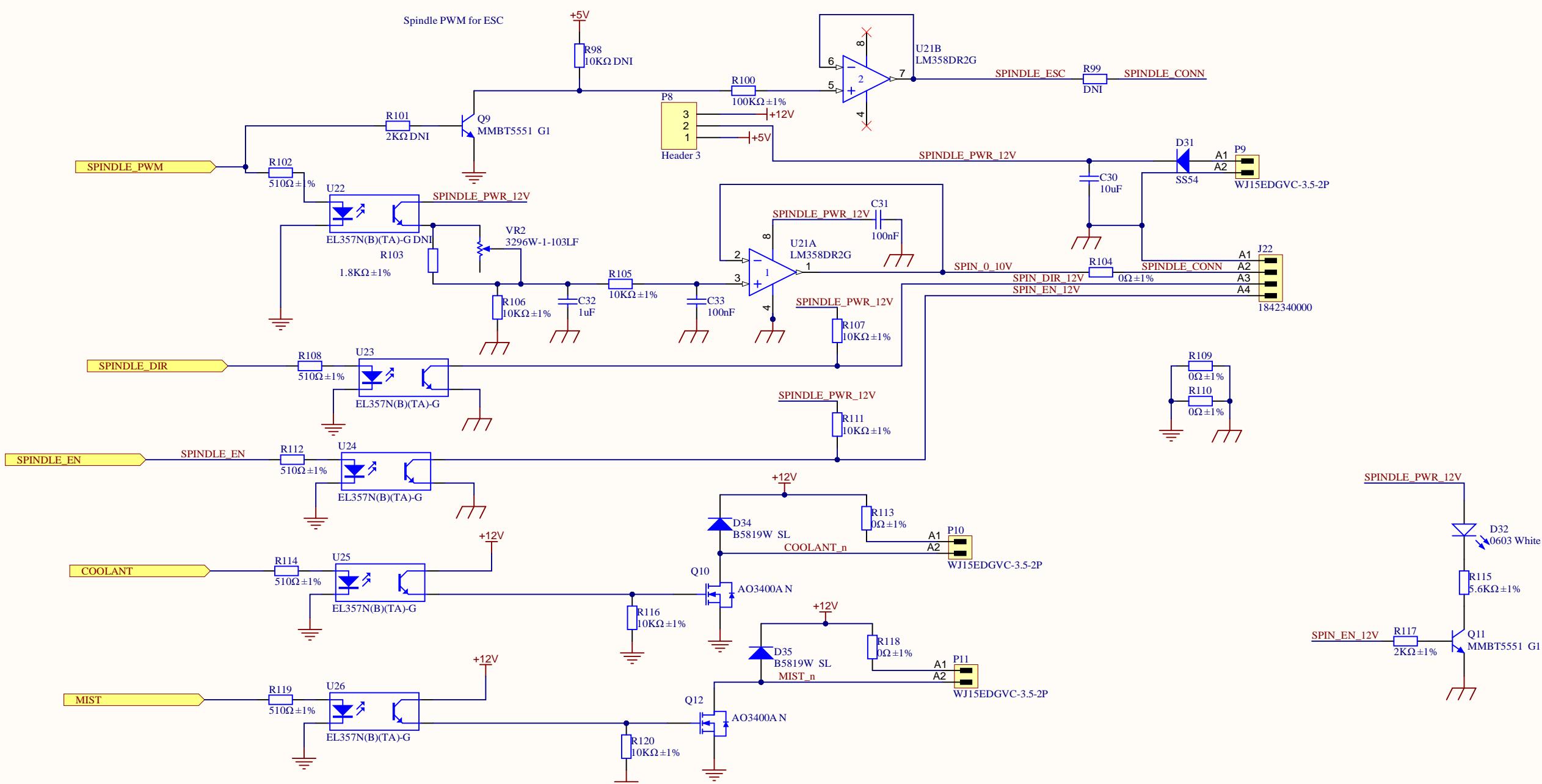
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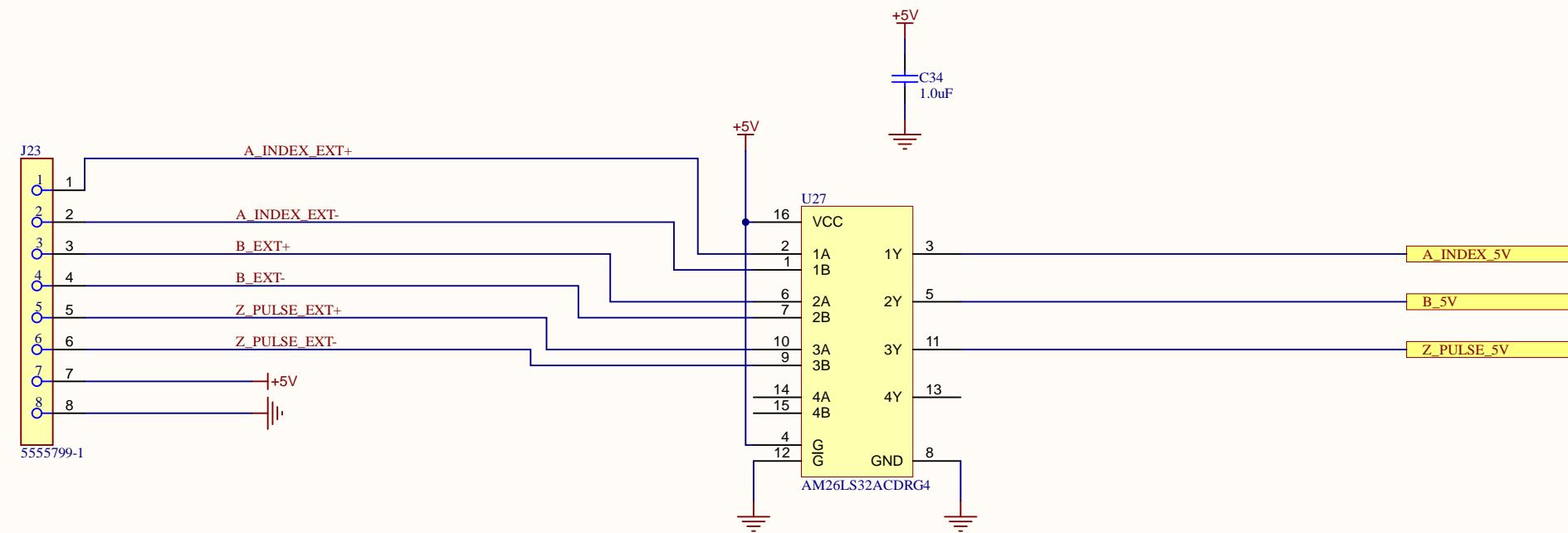
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PROJECT	REV		
ENGR	DOCUMENT		
AM	RS485.SchDoc		
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 11/ 14	

# Spindle Controls



A

A



B

B

C

C

D

D

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SHEET		Spindle_Sync	
PROJECT	REV		
ENGR	DOCUMENT		
AM	Spindle_Sync.SchDoc		
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 12	14

# Stepper Driver

A

A

B

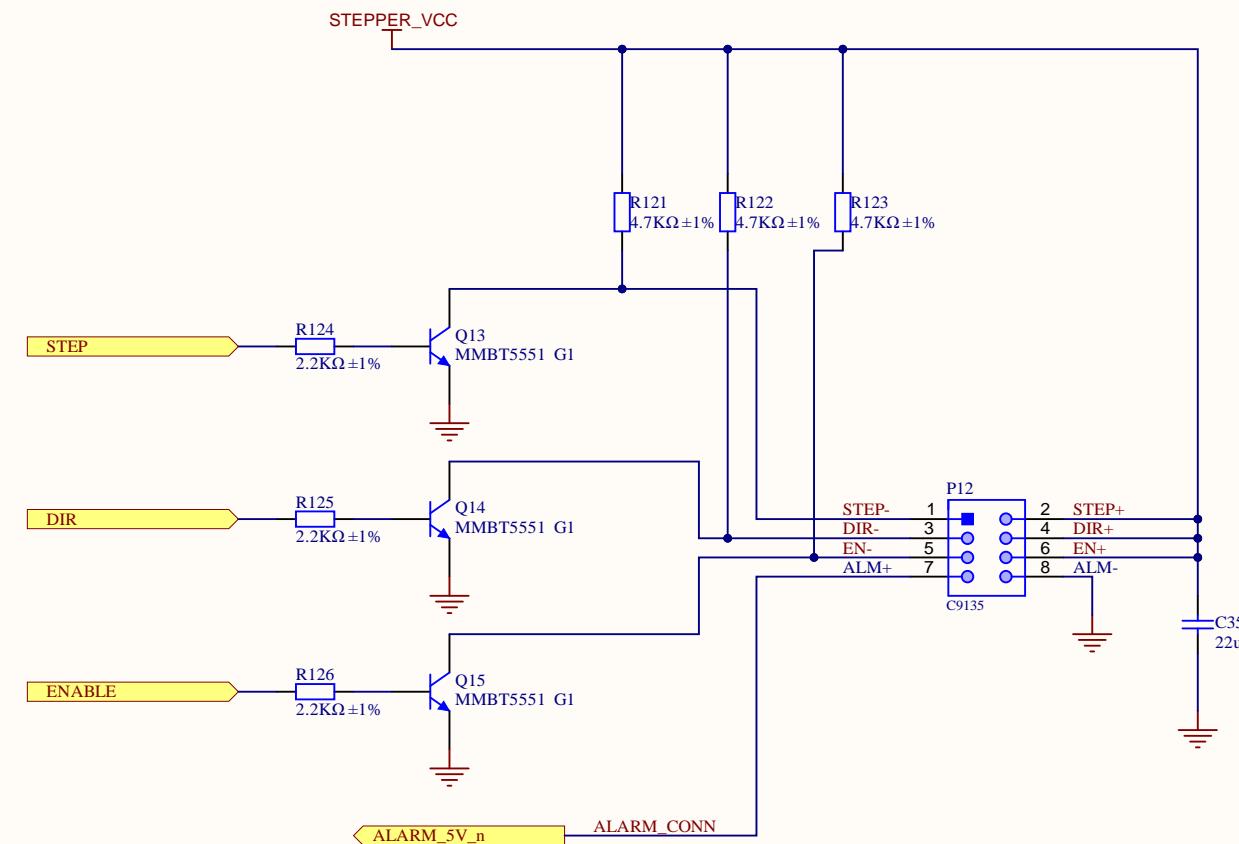
B

C

C

D

D



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Technologies  
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PrintNC\_GRBLHAL\_BreakoutPrjPCB  
ENGR  
AM DOCUMENT  
Stepper\_driver.SchDoc  
SIZE  
B MODIFIED  
2021-06-08 3:21:09 PM

SHEET		Stepper Driver
PROJECT	REV	
ENGR	DOCUMENT	
AM	Stepper_driver.SchDoc	
SIZE	MODIFIED	SHEET
B	2021-06-08 3:21:09 PM	9 / 14

# Stepper Driver

A

A

B

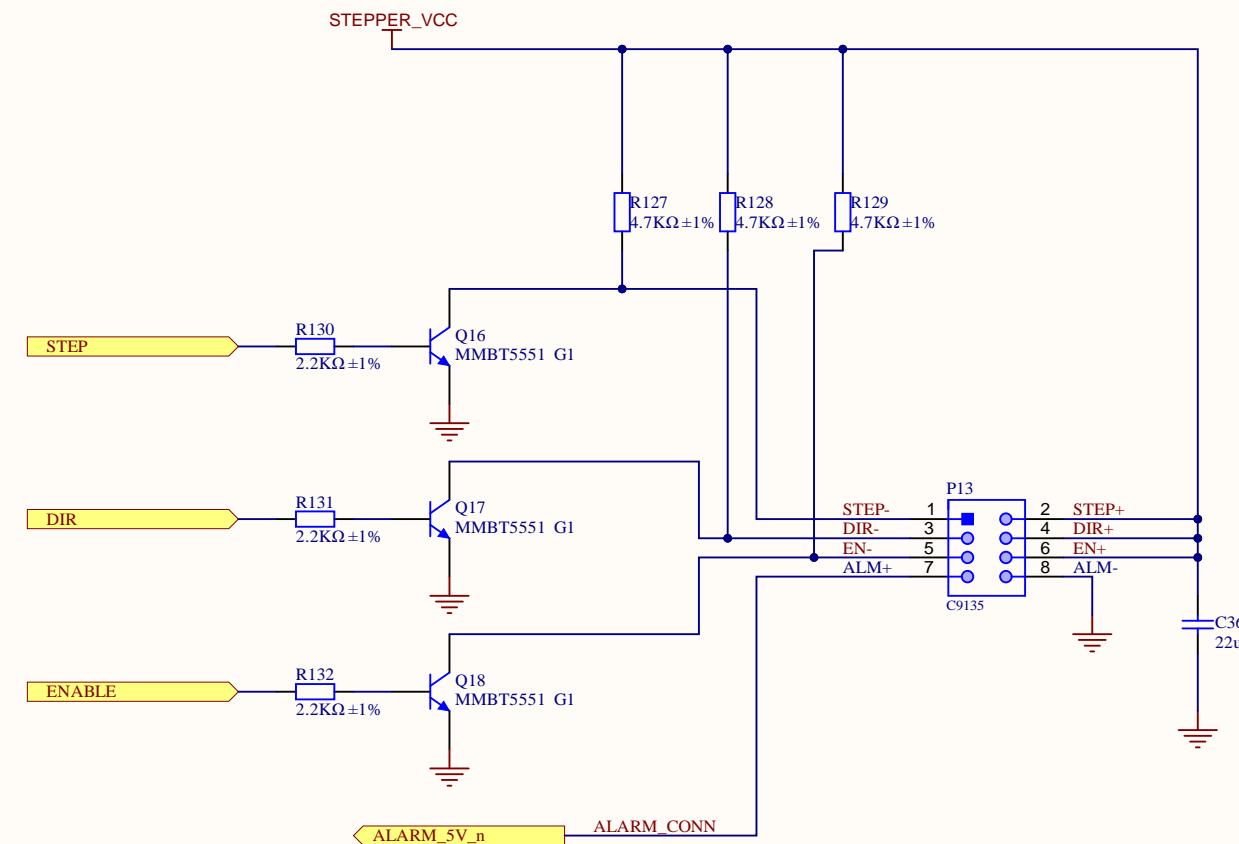
B

C

C

D

D



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PROJECT	REV	DOCUMENT	
PrintNC_GRBLHAL_BreakoutPrjPCB			
AM		Stepper_driver.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 9 / 14	

# Stepper Driver

A

A

B

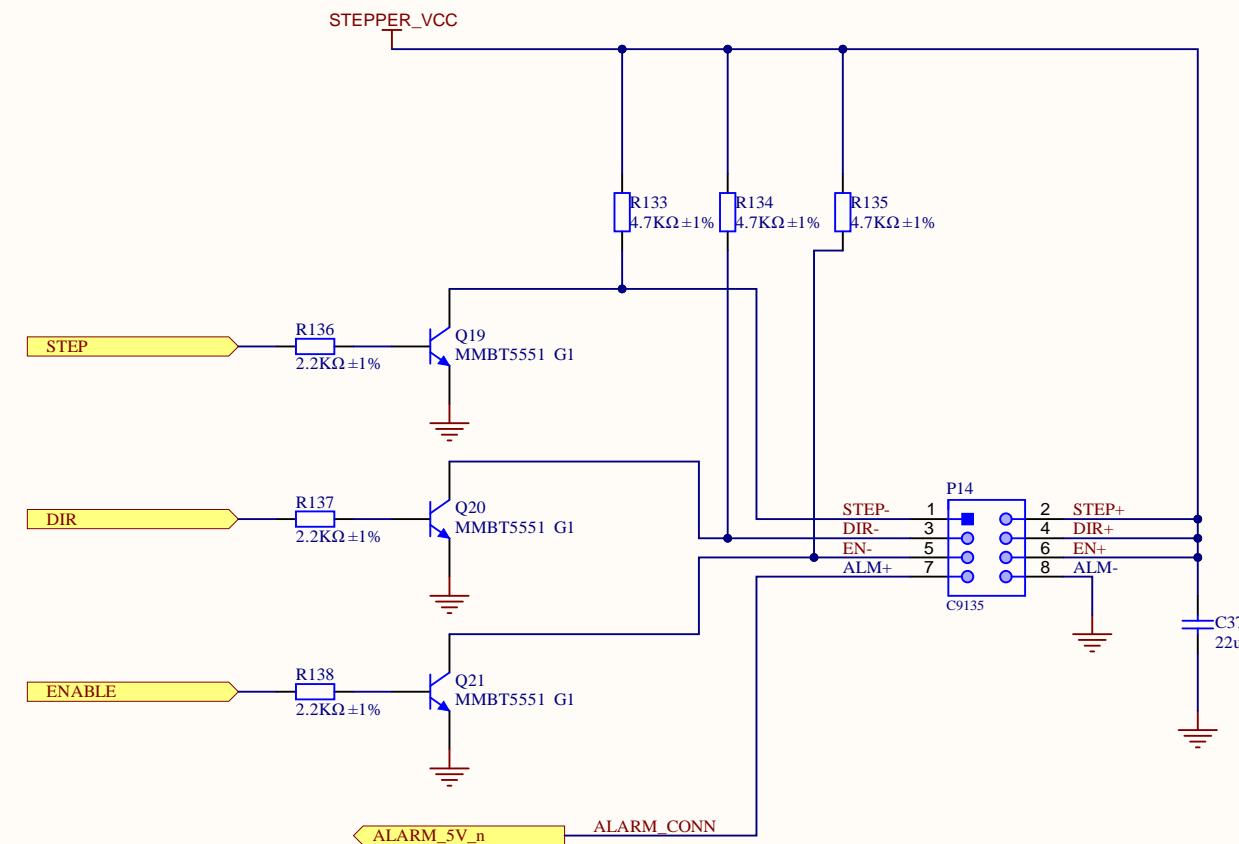
B

C

C

D

D



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PROJECT	REV	DOCUMENT	
PrintNC_GRBLHAL_BreakoutPrjPCB			
AM		Stepper_driver.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 9 / 14	

# Stepper Driver

A

A

B

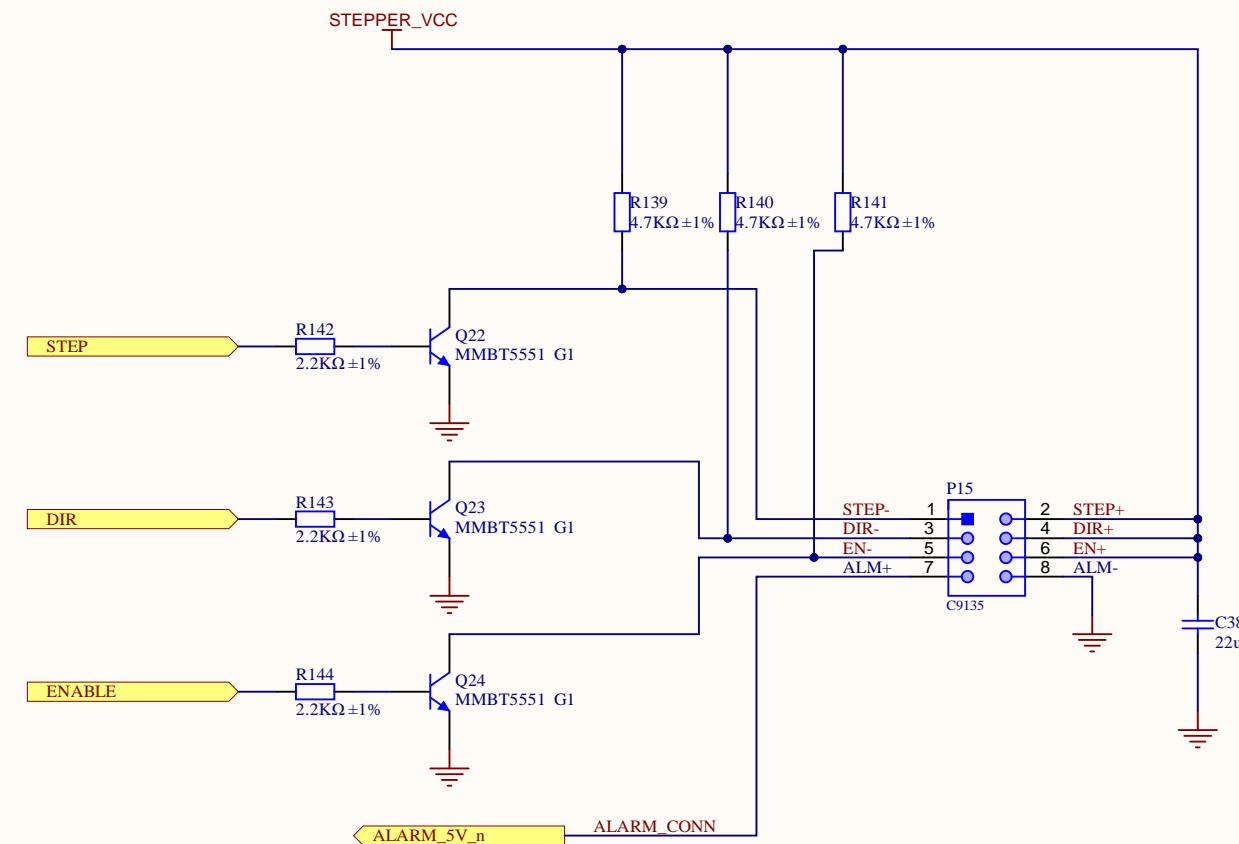
B

C

C

D

D



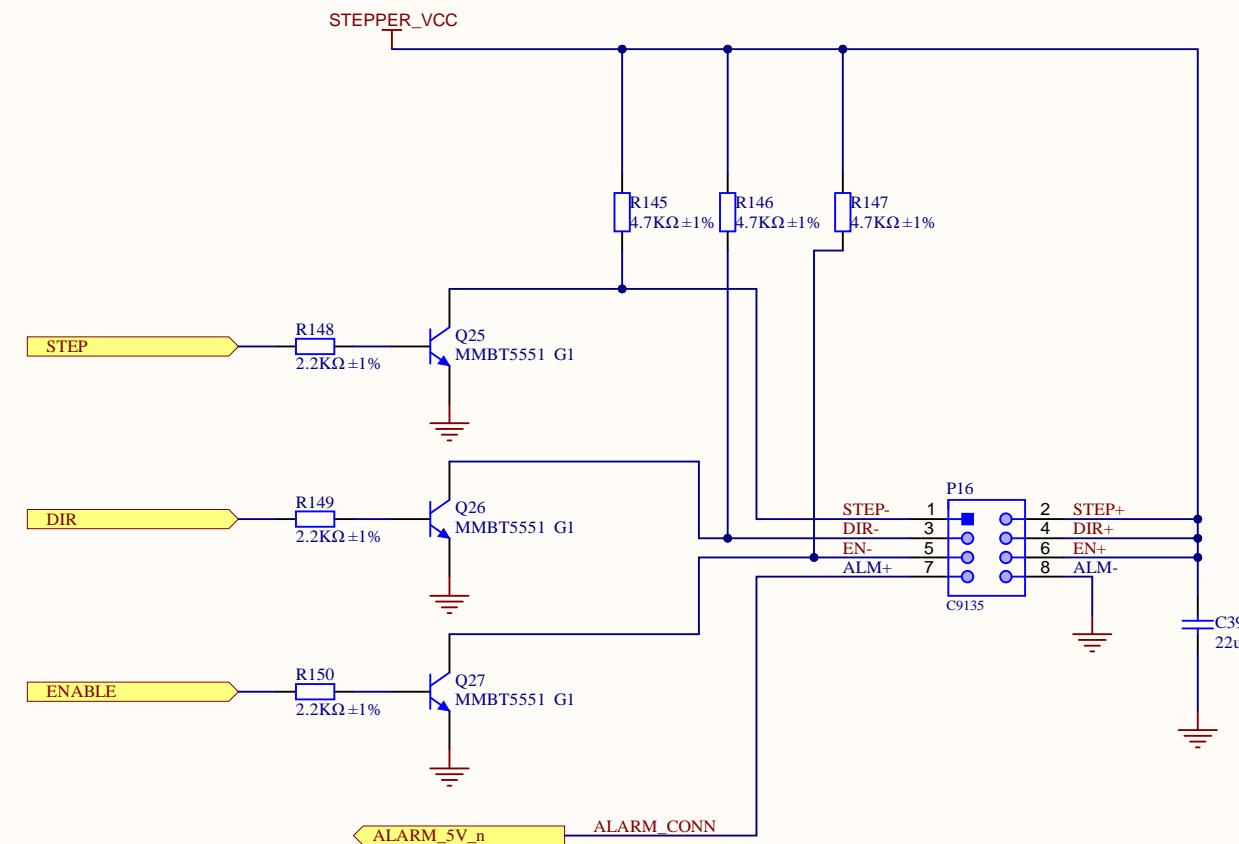
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PROJECT	REV	DOCUMENT	
PrintNC_GRBLHAL_BreakoutPrjPCB			
AM		Stepper_driver.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 9 / 14	

# Stepper Driver



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Sheet		Stepper Driver	
Project		Rev	
PrintNC_GRLHAL_BreakoutAppPCB			
ngr	AM	Document	
ize	B	Stepper_driver.SchDoc	
		Modified	SHEET
		2021-06-08 3:21:09 PM	9 / 14

**User Switches**

A

A

B

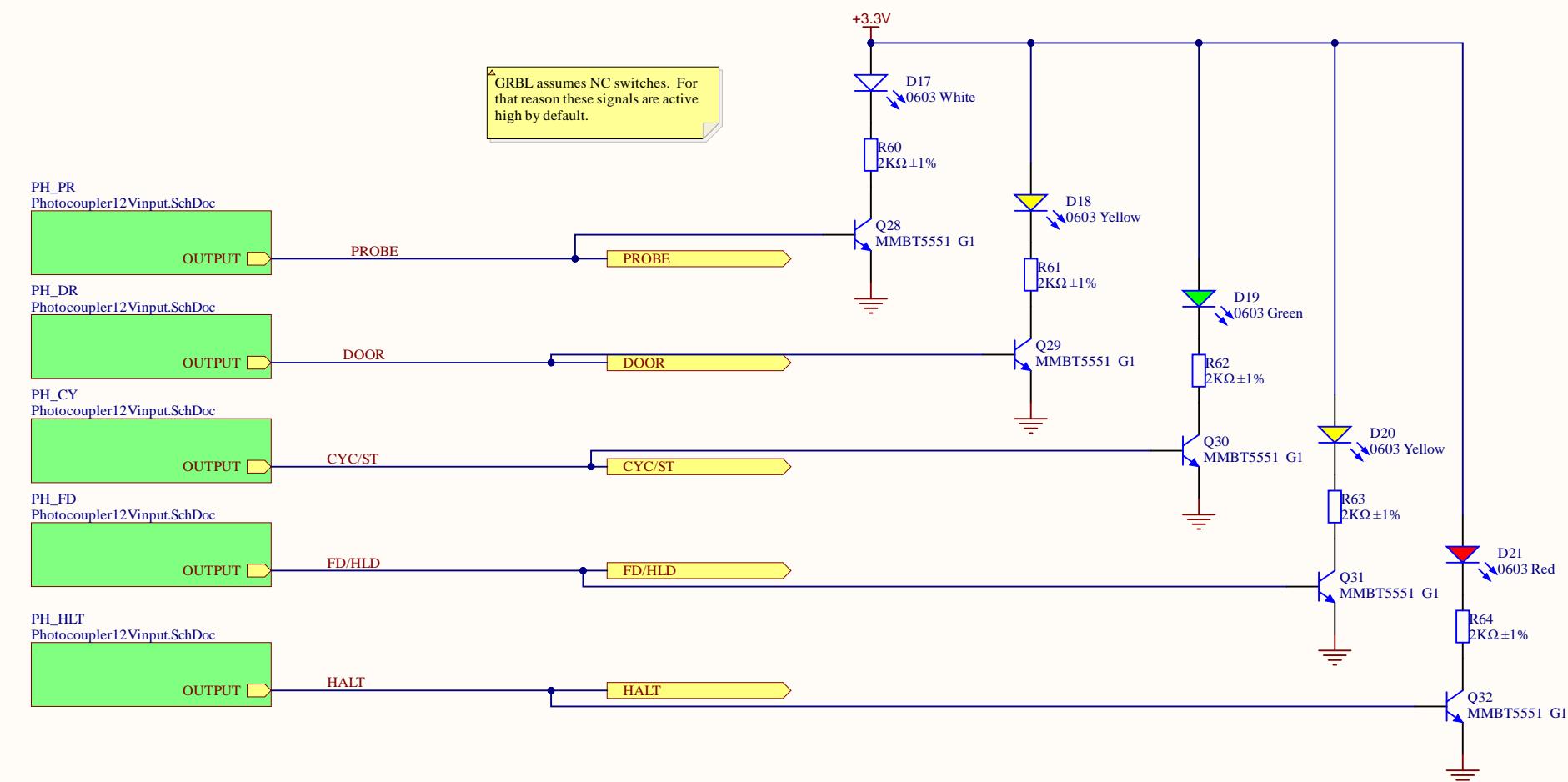
B

C

C

D

D



## Photo Coupler 12V input

A

A

B

B

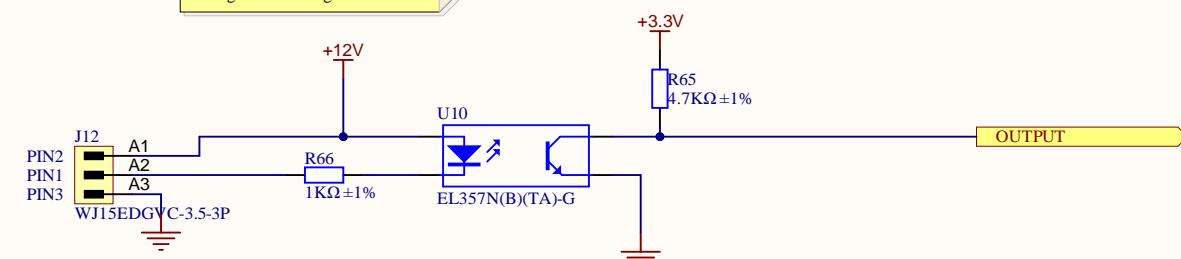
C

C

D

D

<sup>▲</sup> GRBL assumes NC switches. For that reason this circuit is active-high - U2 stops conducting when switch is activated. Inversion must be configurable throughout.



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AM Photocoupler12Vinput.SchDoc  
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SHEET Coupler 12V input		
PROJECT	REV	
PrintNC_GRBLHAL_BreakoutPrjPCB		
ENGR	DOCUMENT	
AM	Photocoupler12Vinput.SchDoc	
SIZE	MODIFIED	SHEET
B	2021-06-08 3:21:09 PM	8 / 14

## Photo Coupler 12V input

A

A

B

B

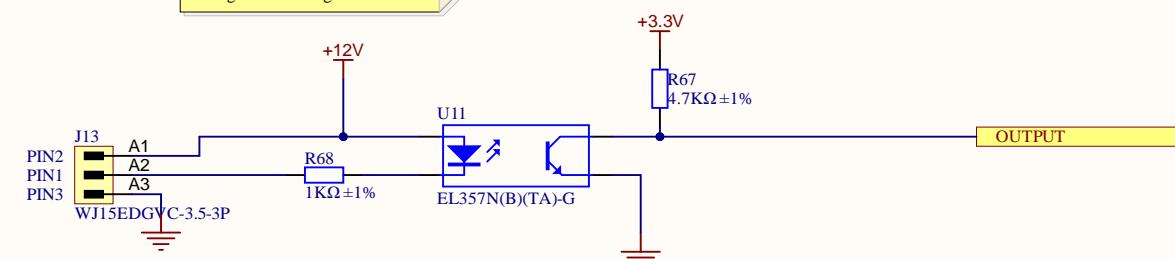
C

C

D

D

<sup>▲</sup> GRBL assumes NC switches. For that reason this circuit is active-high - U2 stops conducting when switch is activated. Inversion must be configurable throughout.



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SHEET Coupler 12V input		
PROJECT	REV	
ENGR	DOCUMENT	
AM	Photocoupler12Vinput.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 8 / 14

## Photo Coupler 12V input

A

A

B

B

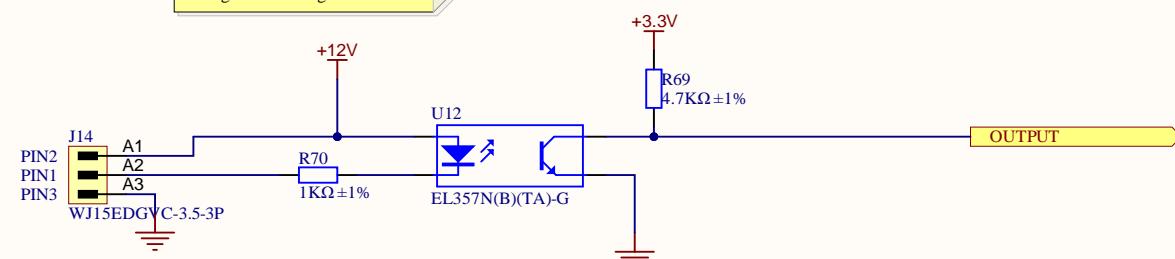
C

C

D

D

<sup>▲</sup> GRBL assumes NC switches. For that reason this circuit is active-high - U2 stops conducting when switch is activated. Inversion must be configurable throughout.



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SHEET Coupler 12V input		
PROJECT	REV	
ENGR	DOCUMENT	
AM	Photocoupler12Vinput.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 8 / 14

## Photo Coupler 12V input

A

A

B

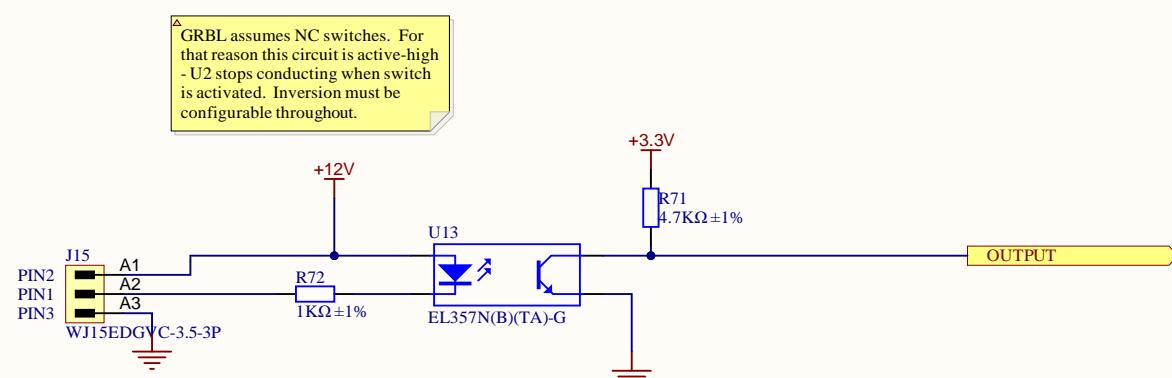
B

C

C

D

D



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PROJECT	REV	
ENGR	DOCUMENT	
AM	Photocoupler12Vinput.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:09 PM	SHEET 8 / 14

## Photo Coupler 12V input

A

A

B

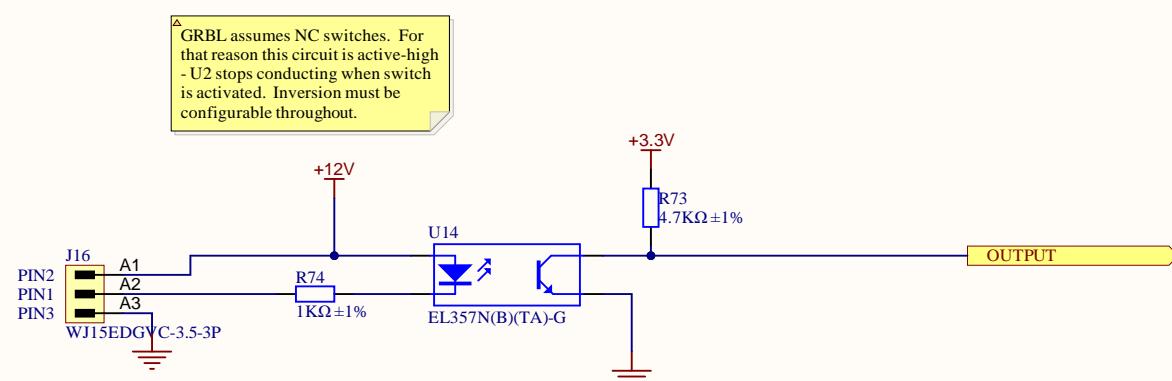
B

C

C

D

D



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SHEET Coupler 12V input		
PROJECT	REV	
ENGR	DOCUMENT	
AM	Photocoupler12Vinput.SchDoc	
SIZE B	MODIFIED 2021-06-08 3:21:10 PM	SHEET 8 / 14

## Change Log

Date	Revision	Description

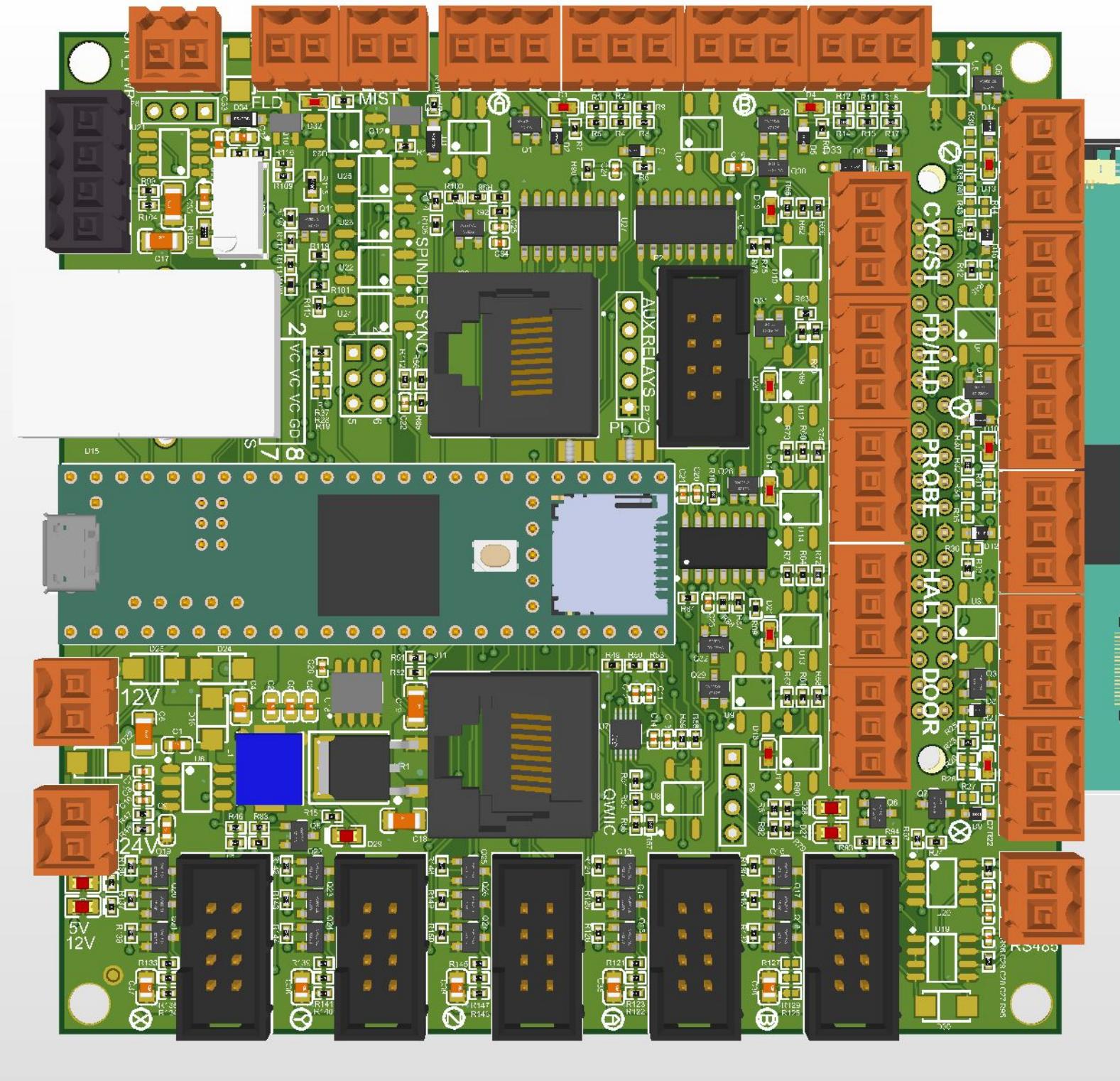
Date	Revision	Description

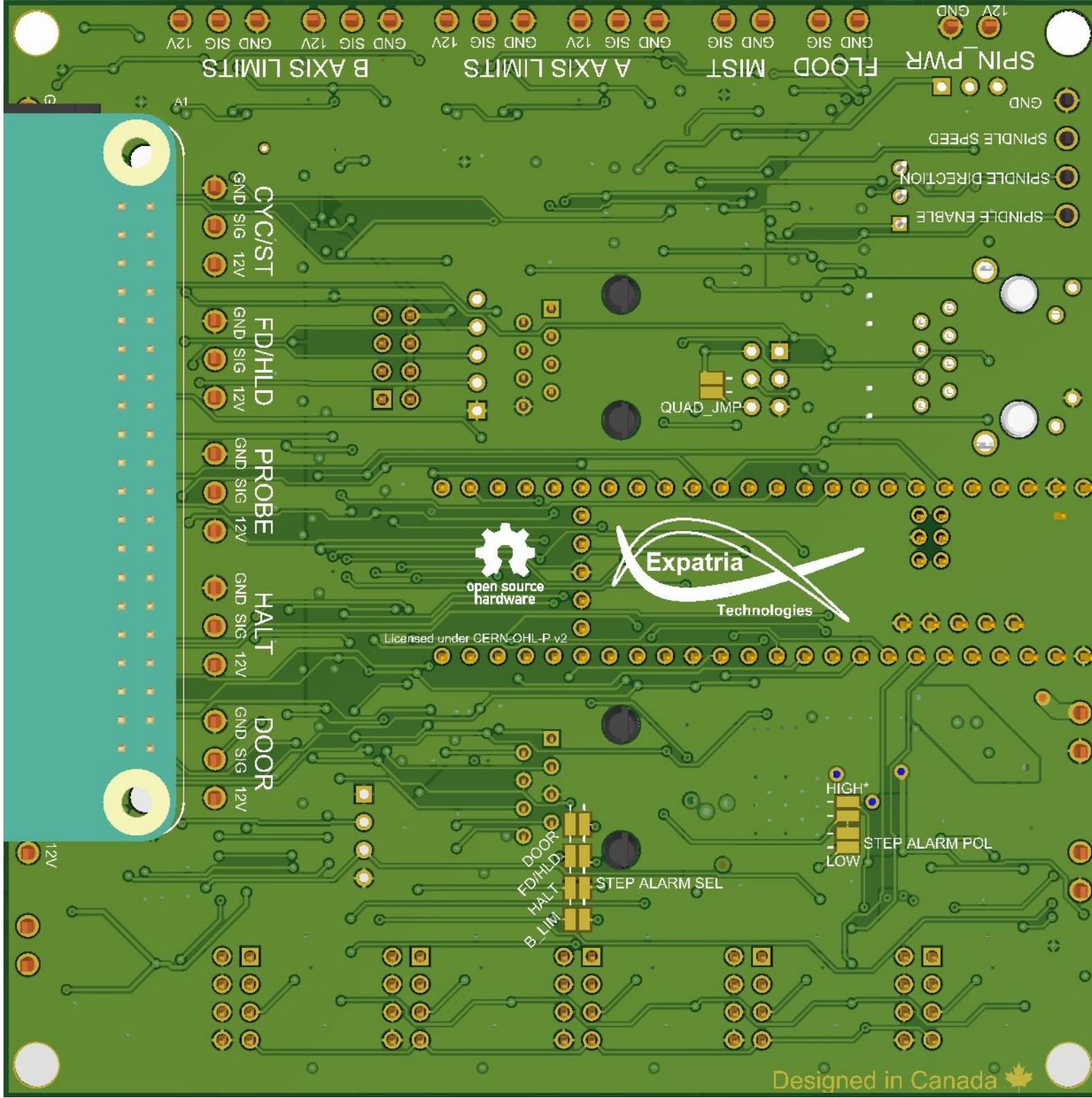
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SHEET		Change Log	
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ENGR	DOCUMENT		
AM	Change Log.SchDoc		
SIZE	MODIFIED	SHEET	
B	2021-06-08 3:21:10 PM	14	14





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