

# BLDC motor controller

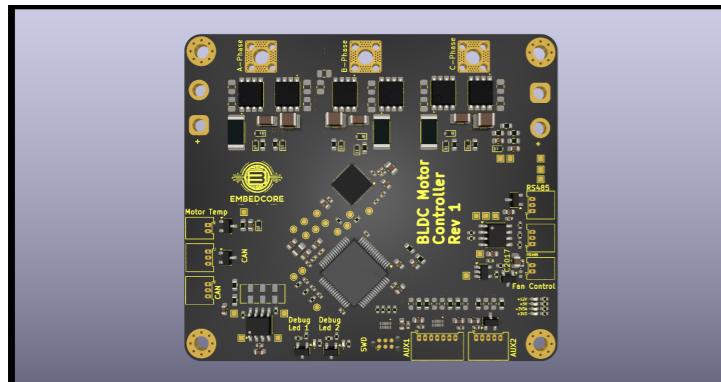
2024-12-09

Variant: **CHECKED**

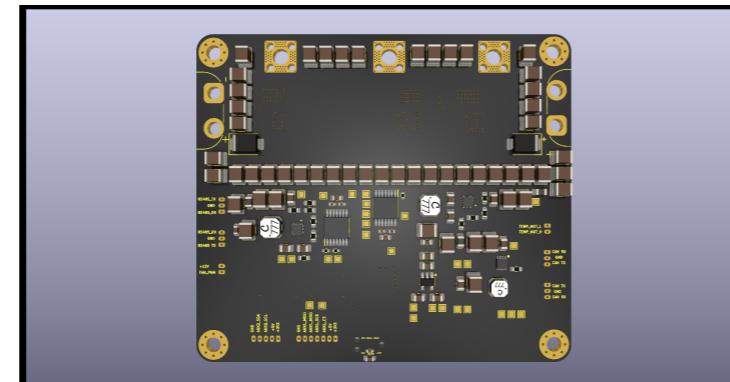
Rev 1.0

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## TOP VIEW



## BOTTOM VIEW



## NOTES

Add a comment here

Not fitted components are marked as

DRAFT - Very early stage of schematic, ignore details.

PRELIMINARY - Close to final schematic.

CHECKED - There shouldn't be any mistakes. Contact the engineer if you find any.

RELEASED - A board with this schematic has been sent to production.

**CHECKED - 24 / 12 / 2024**

## DESIGN CONSIDERATIONS

DESIGN NOTE:  
Example text for informational design notes.

DESIGN NOTE:  
Example text for debug notes.

DESIGN NOTE:  
Example text for cautionary design notes.

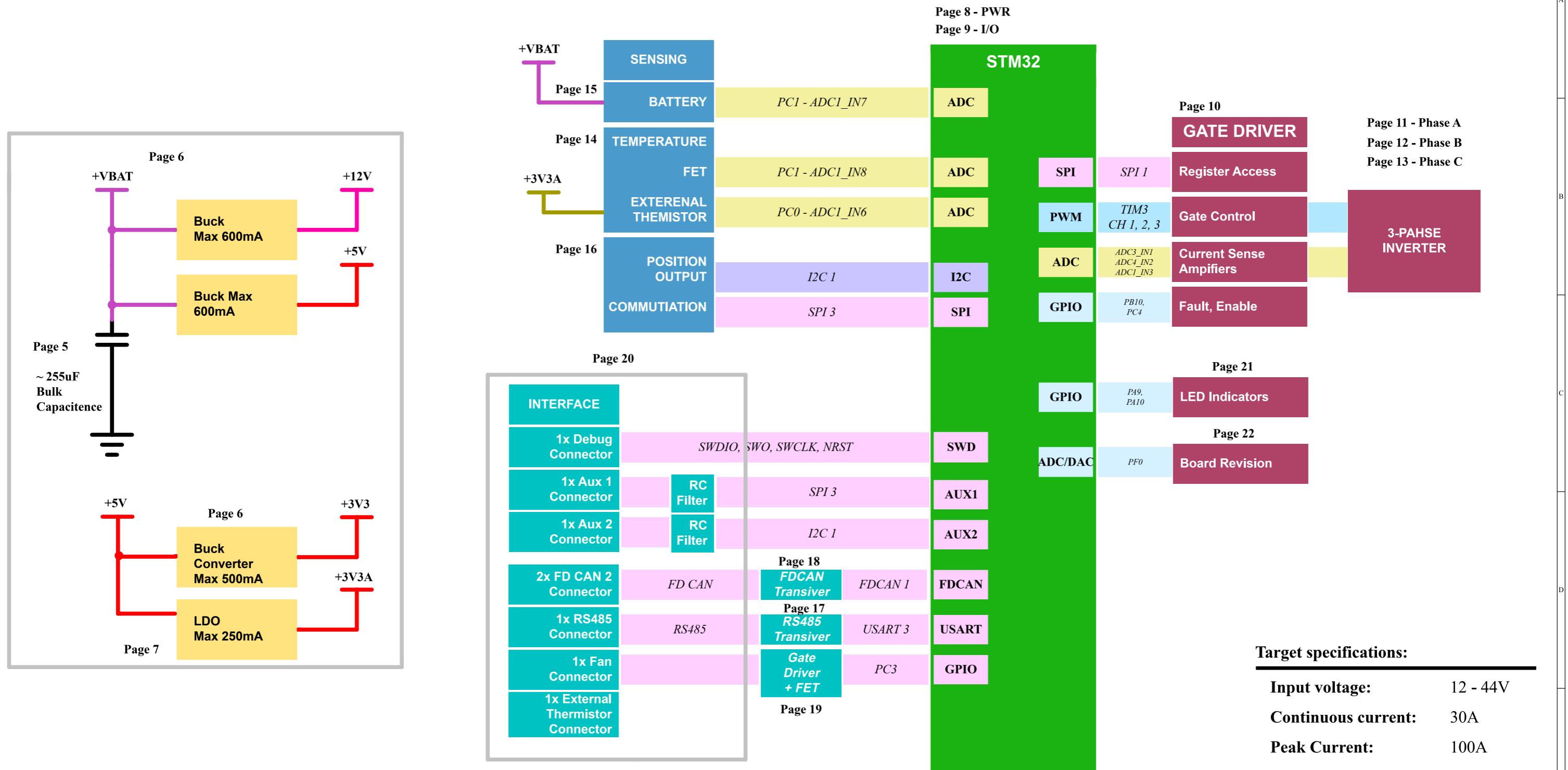
DESIGN NOTE:  
Example text for critical design notes.

LAYOUT NOTE:  
Example text for critical layout guidelines.



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	EmbedCore	CHECKED
Board Name:	BLDC motor controller	Project Name:
	BLDC motor controller	BLDC motor controller
Sheet Title:	File Name:	Revision:
Cover Page	BLDC motor controller.kicad_sch	Date: Last Modified Date
		1.0
Sheet Path:	Reviewer:	Size:
/	Nagy Richárd	A3
		Sheet:
		1 of 25

# [2] Block Diagram



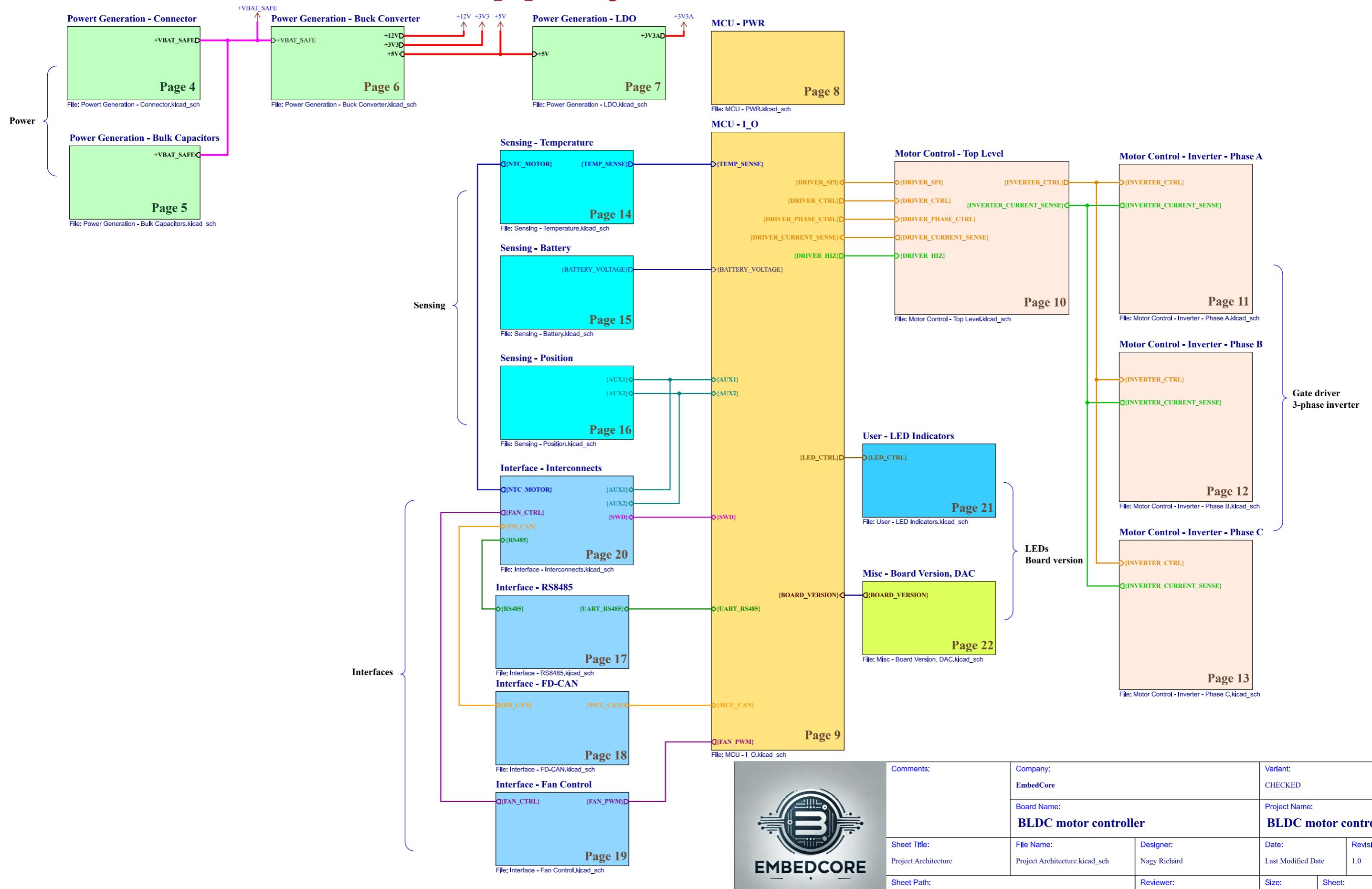
## Target specifications:

<b>Input voltage:</b>	12 - 44V
<b>Continuous current:</b>	30A
<b>Peak Current:</b>	100A
<b>Switching Frequency:</b>	15 - 60 kHz

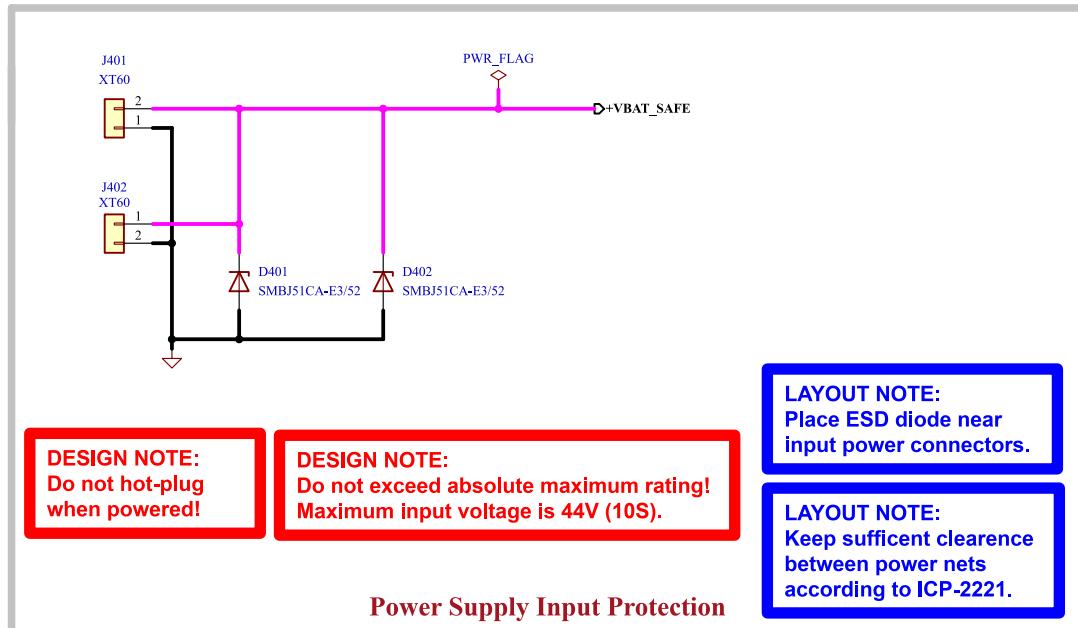


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BLDC motor controller	BLDC motor controller	
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Date:	Last Modified Date	Revision:
		1.0
Sheet Path:	Reviewer:	Size:
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		Sheet:
		2 of 25

# [3] Project Architecture

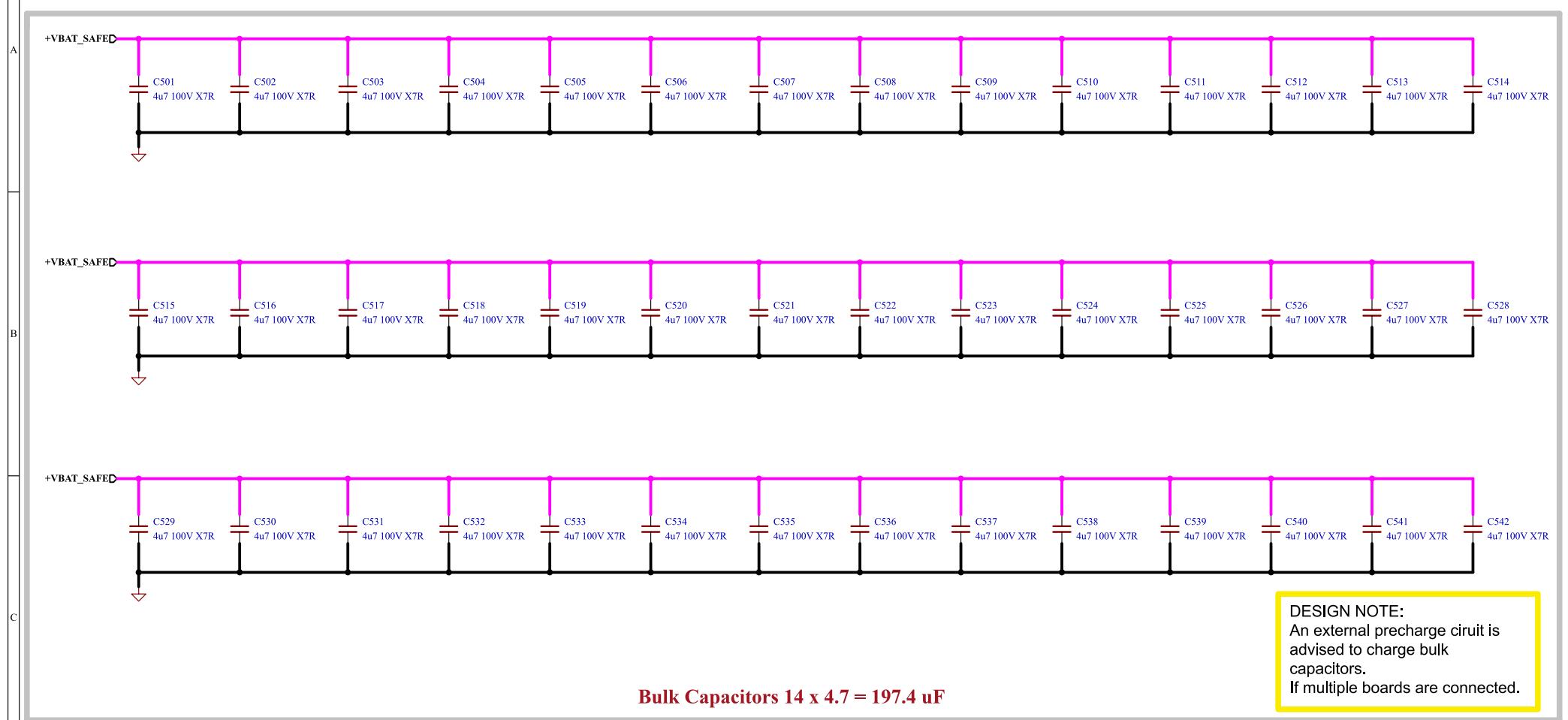


## [4] Powert Generation - Connector



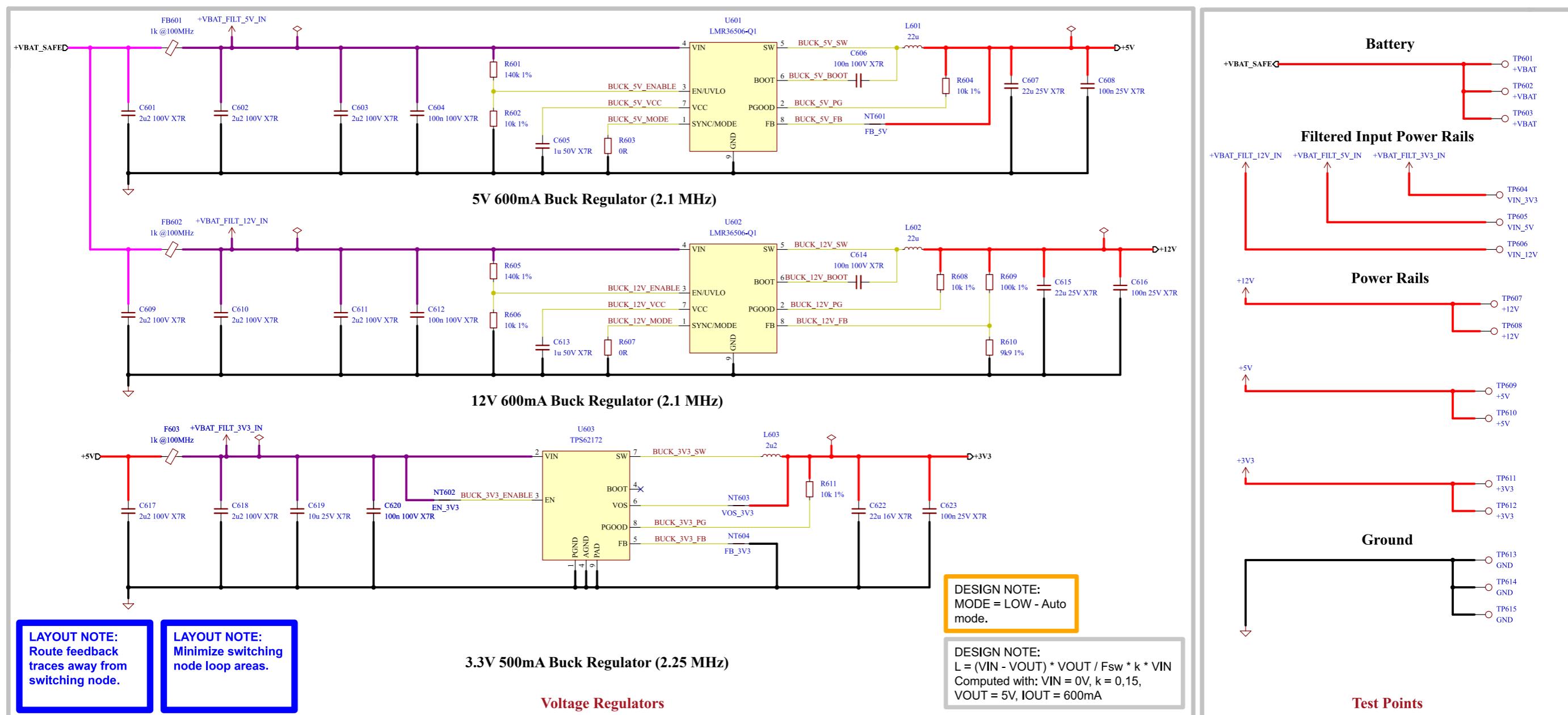
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Sheet Title: Powert Generation - Connector	File Name: Powert Generation - Connector.kicad_sch	Designer: Nagy Richárd	Date: Last Modified Date
Sheet Path: /Project Architecture/Powert Generation - Connector/	Reviewer: Nagy Richárd	Size: <b>A4</b>	Revision: 1.0

# [5] Power Generation - Bulk Capacitors



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Sheet Title:	File Name:	Designer:	Date:	Revision:
Power Generation - Bulk Capacitors	Power Generation - Bulk Capacitors.kicad_pcb	Nagy Richárd	Last Modified Date	1.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Project Architecture/Power Generation - Bulk Capacitors/	Nagy Richárd		<b>A4</b>	<b>5</b> of <b>25</b>

# [6] Power Generation - Buck Converter



Comments:  
+12V - Fan Power  
+5V - Gate Driver, Led  
+3V3 - Digital 3V3

Company:  
EmbedCore

Variant:  
CHECKED

Board Name:  
**BLDC motor controller**

Project Name:  
**BLDC motor controller**

Sheet Title:  
File Name:  
Designer:  
Date:  
Last Modified Date

Revision:  
1.0

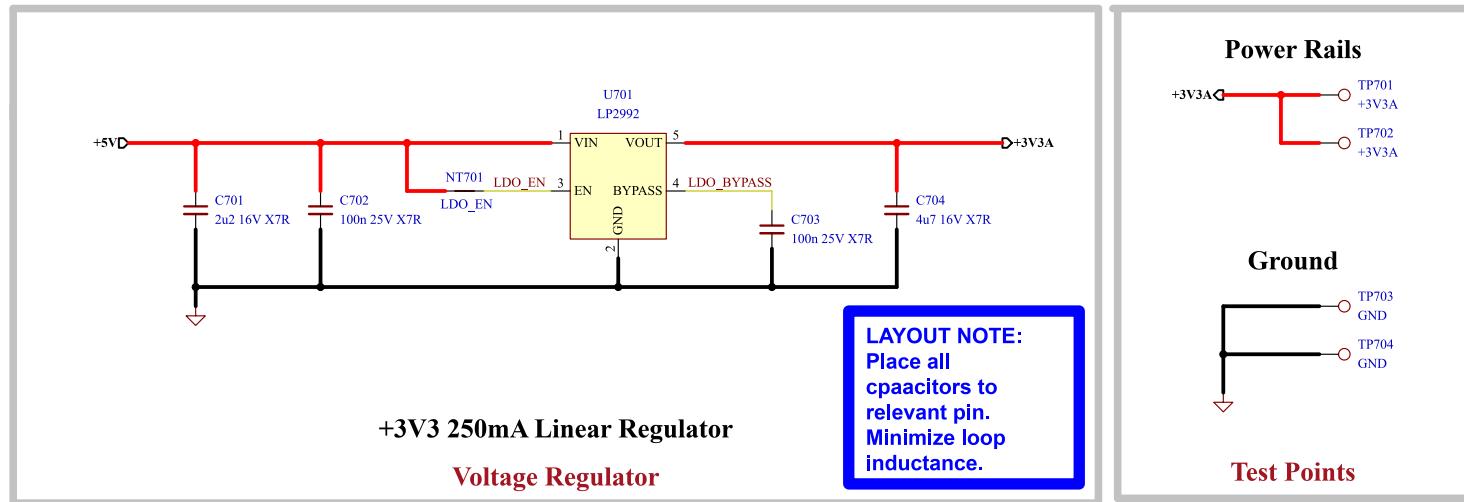
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Reviewer:  
Nagy Richárd

Size:  
**A3**

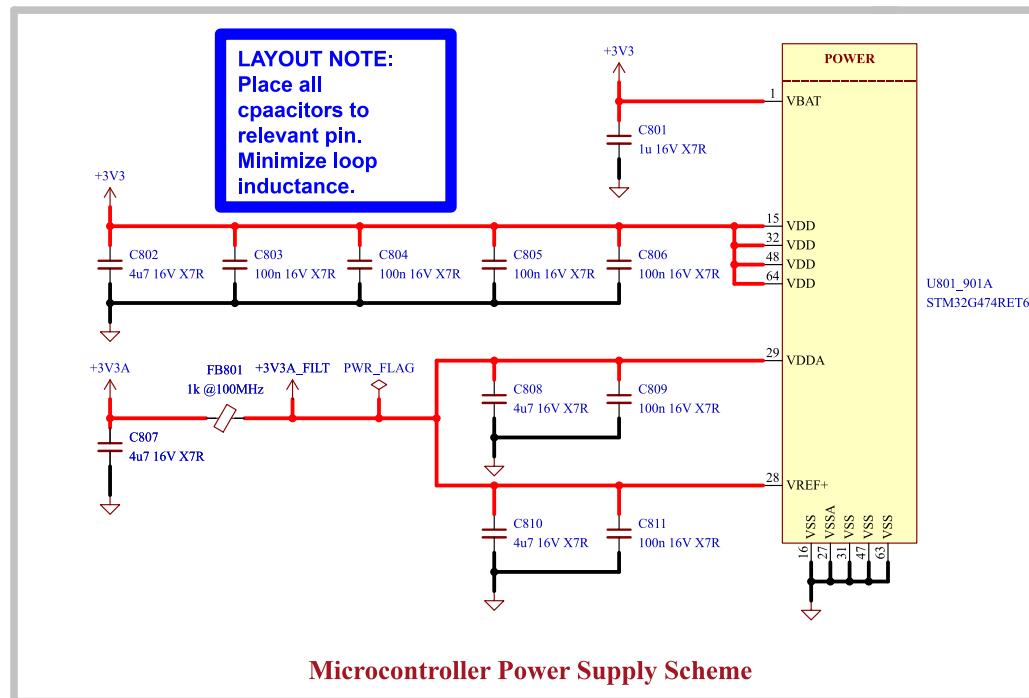
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# [7] Power Generation - LDO



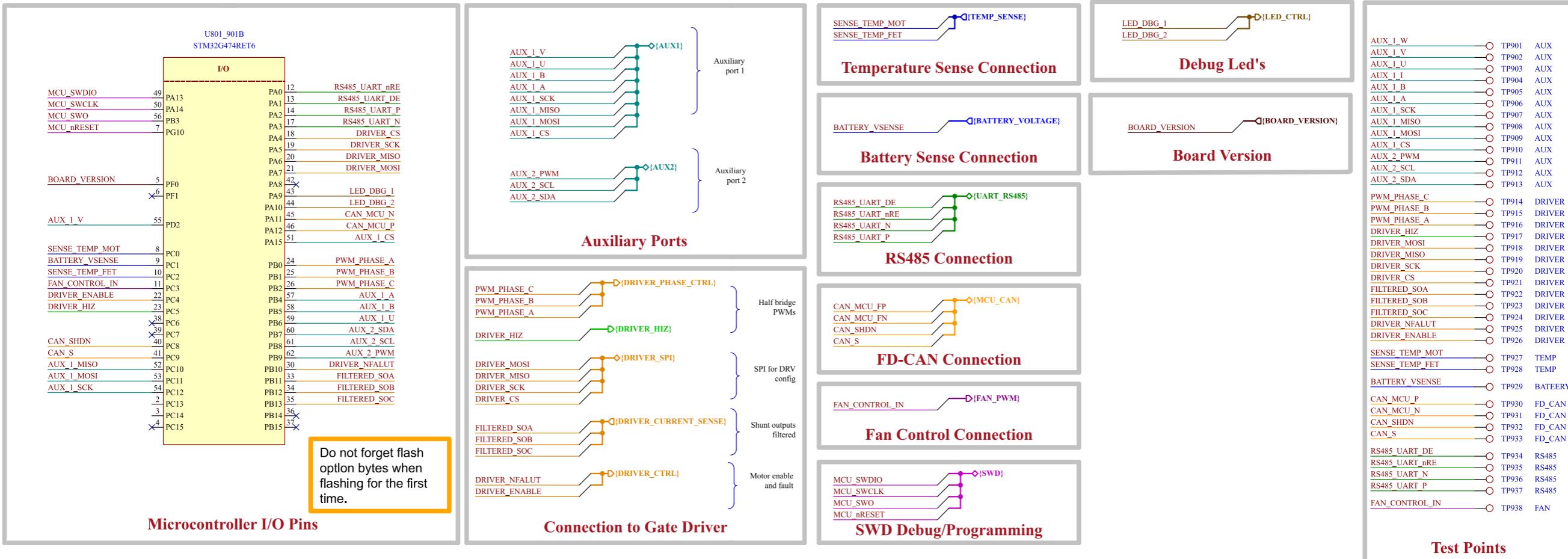
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# [8] MCU - PWR



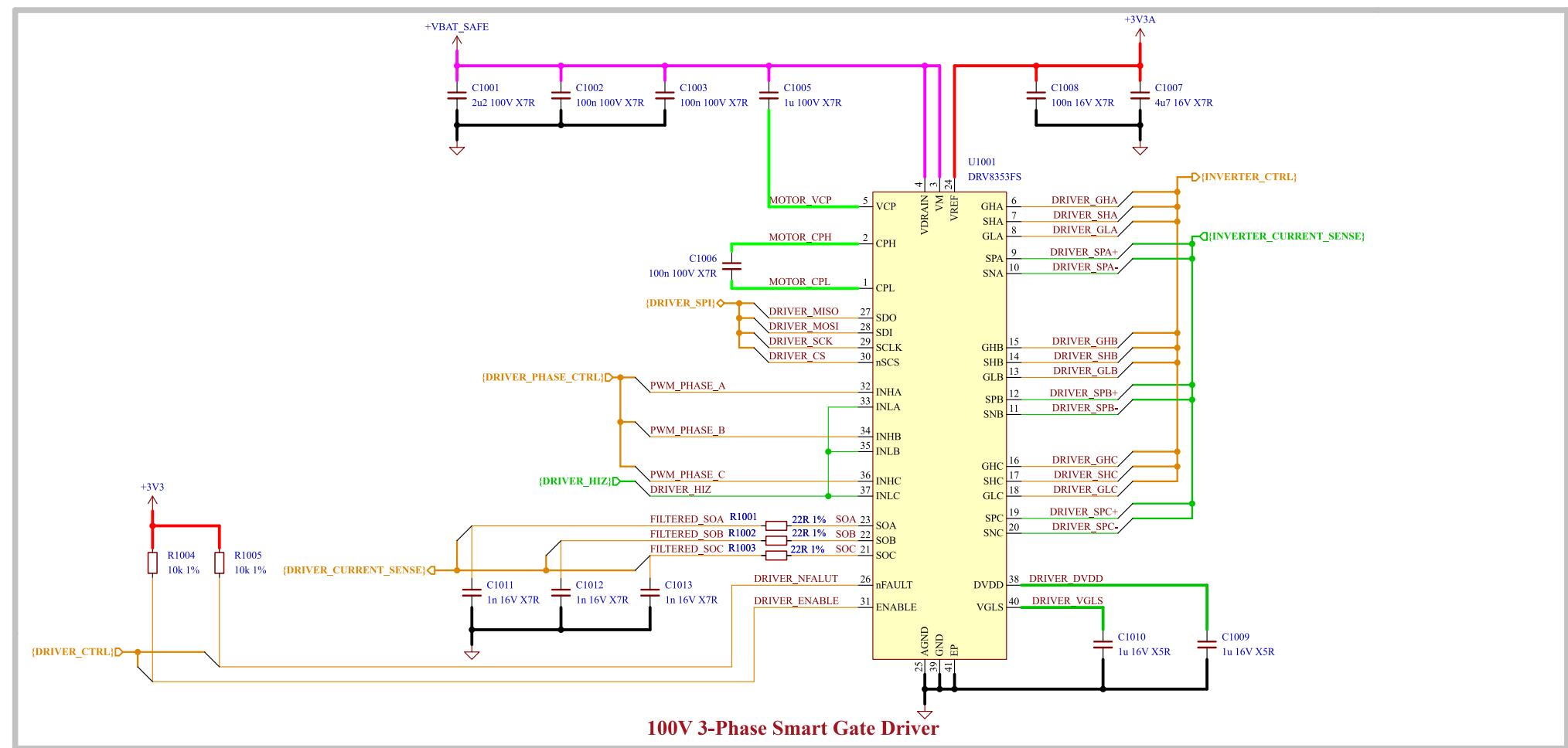
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# [9] MCU - I/O



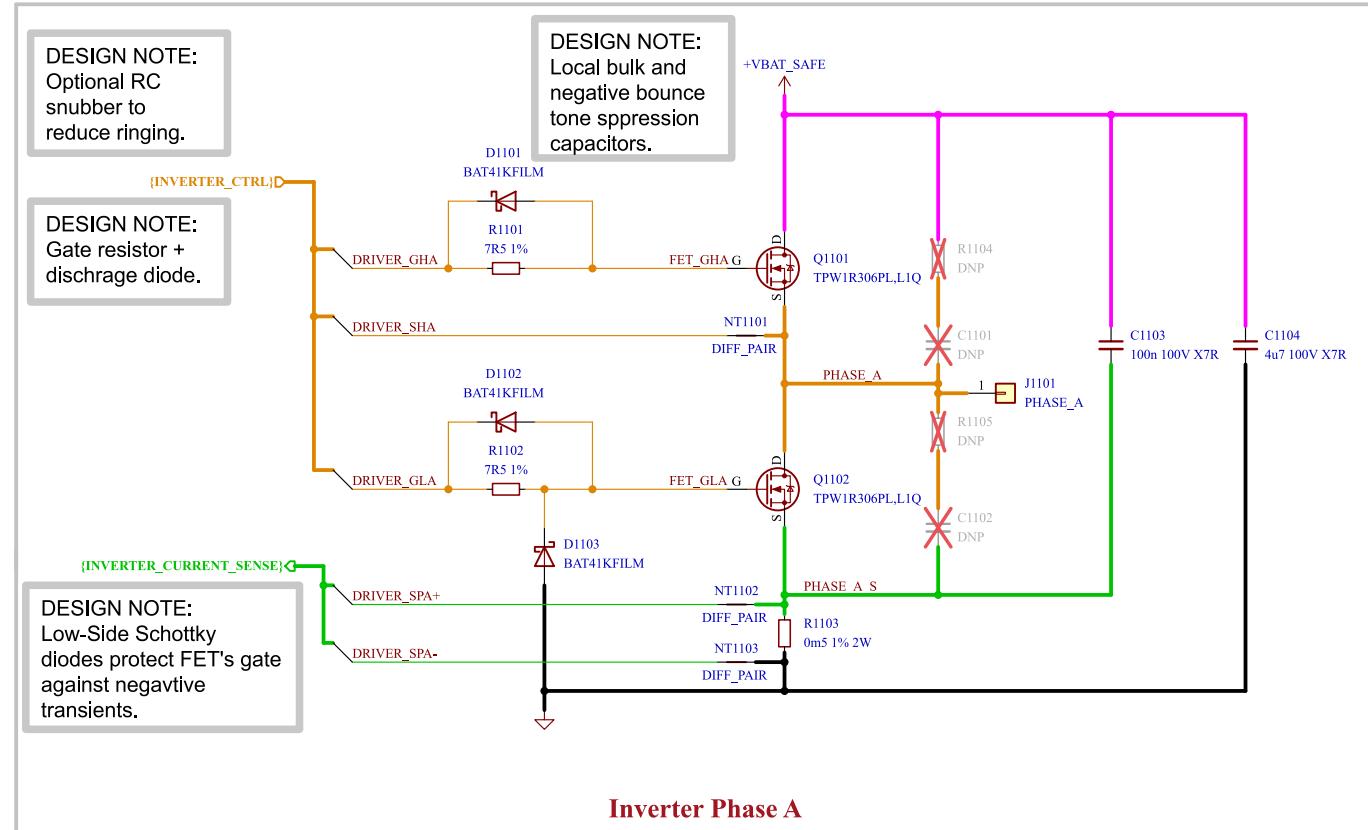
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A3	9	of 25

# [10] Motor Control - Top Level



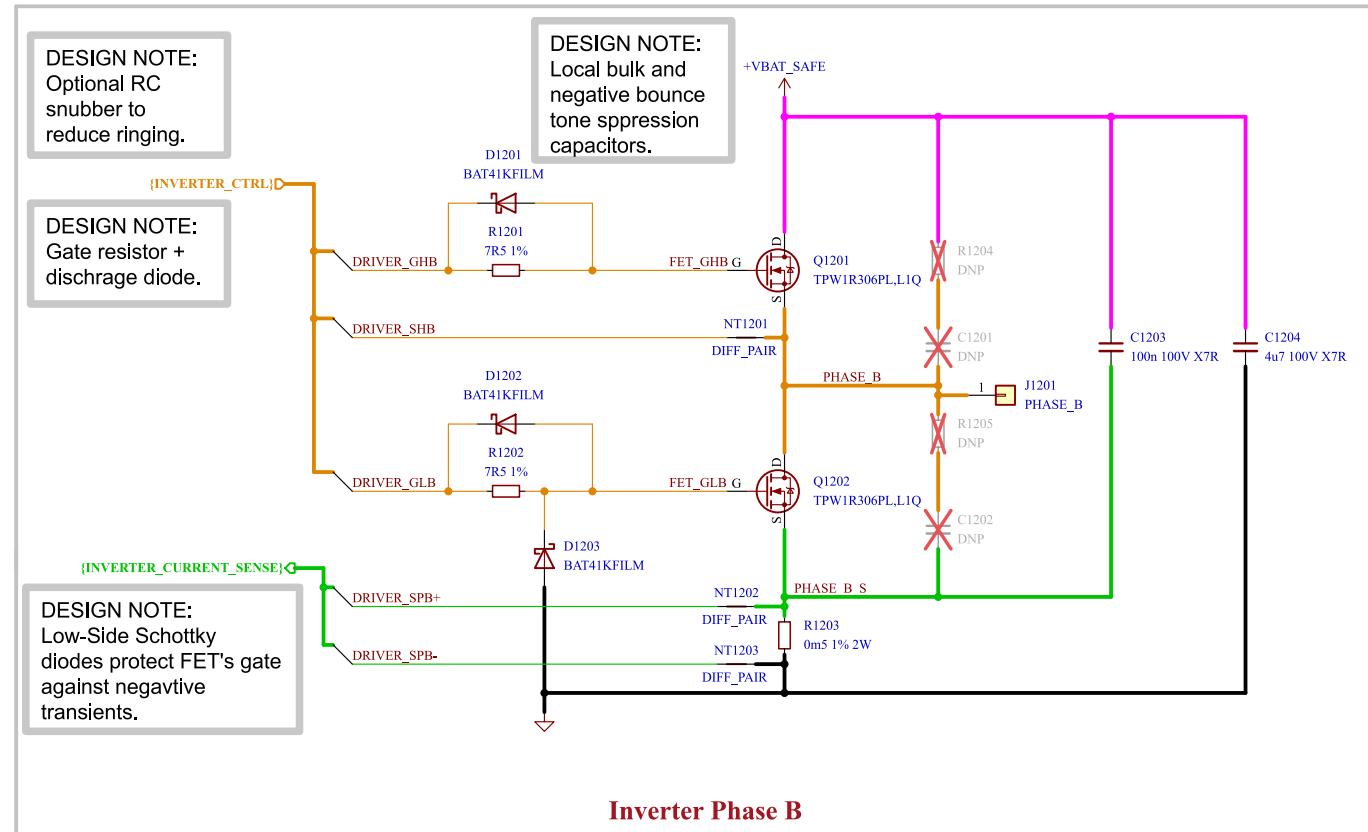
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Sheet Path:	Reviewer:	Date:
/Project Architecture/Motor Control - Top Level/	Nagy Richárd	Last Modified Date 1.0
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# [11] Motor Control - Inverter - Phase A



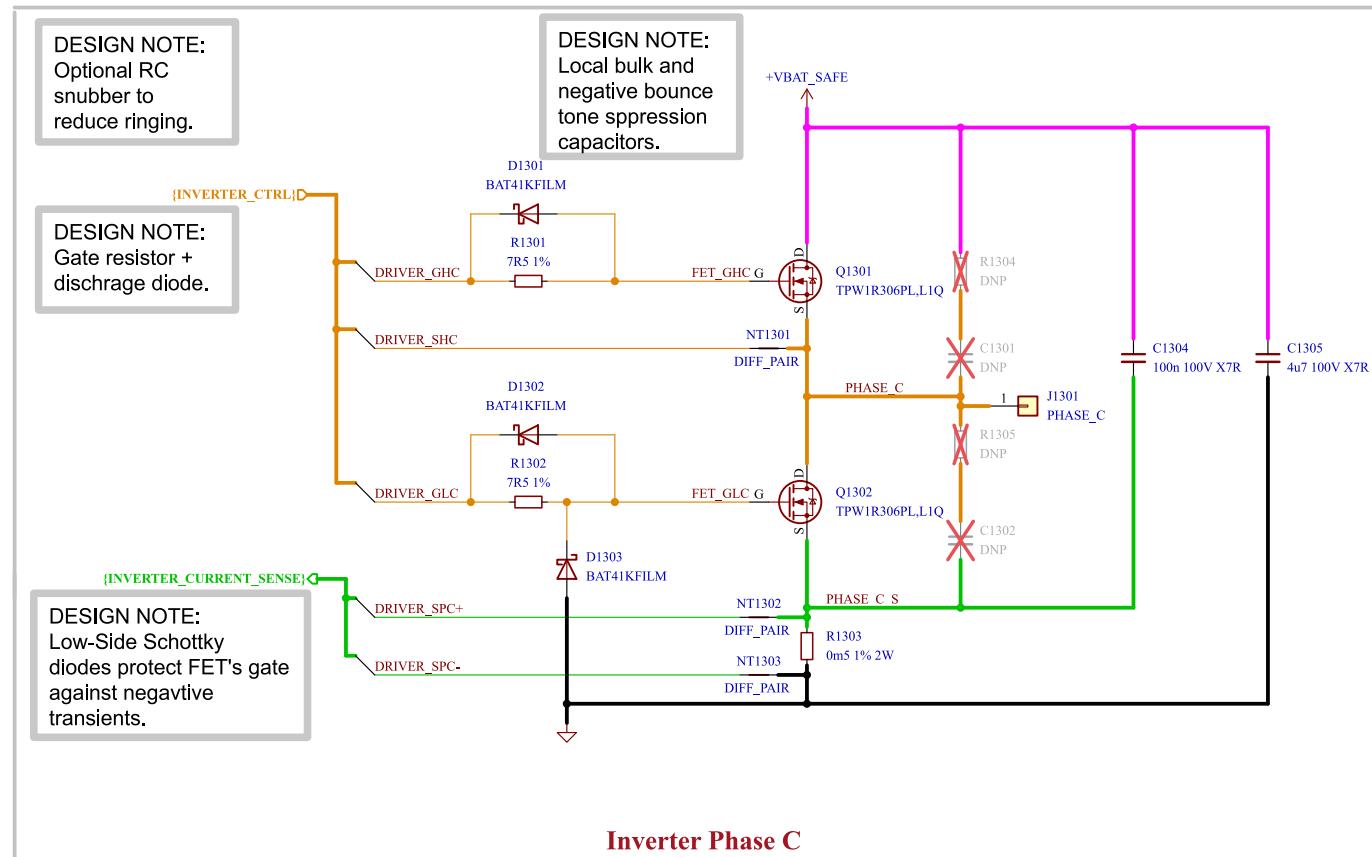
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# [12] Motor Control - Inverter - Phase B



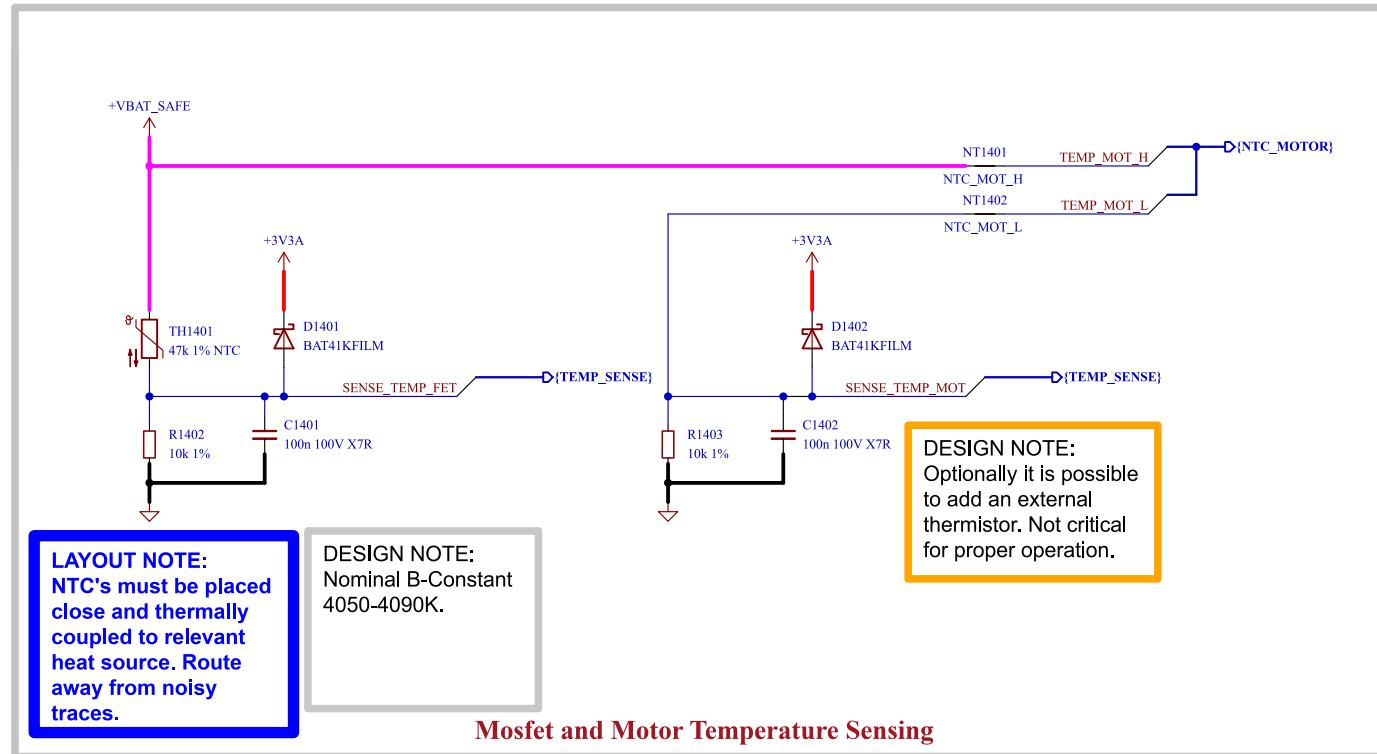
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# [13] Motor Control - Inverter - Phase C



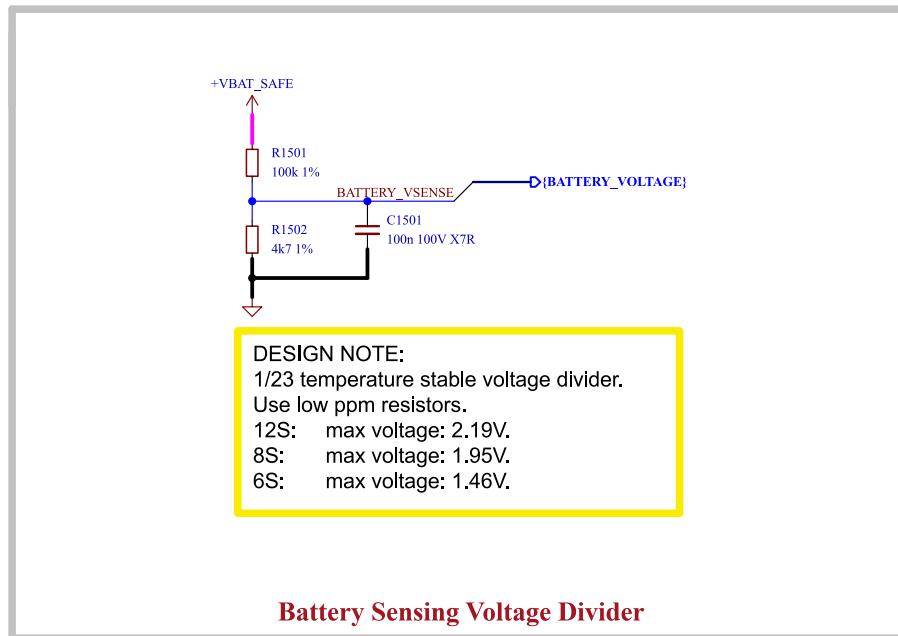
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/Project Architecture/Motor Control - Inverter - Phase C/	Nagy Richárd	Last Modified Date 1.0
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# [14] Sensing - Temperature



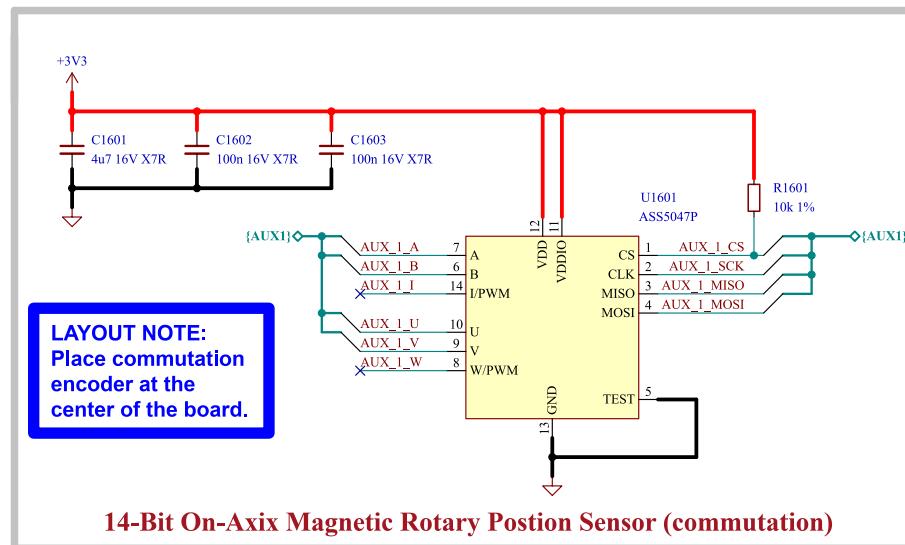
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# [15] Sensing - Battery

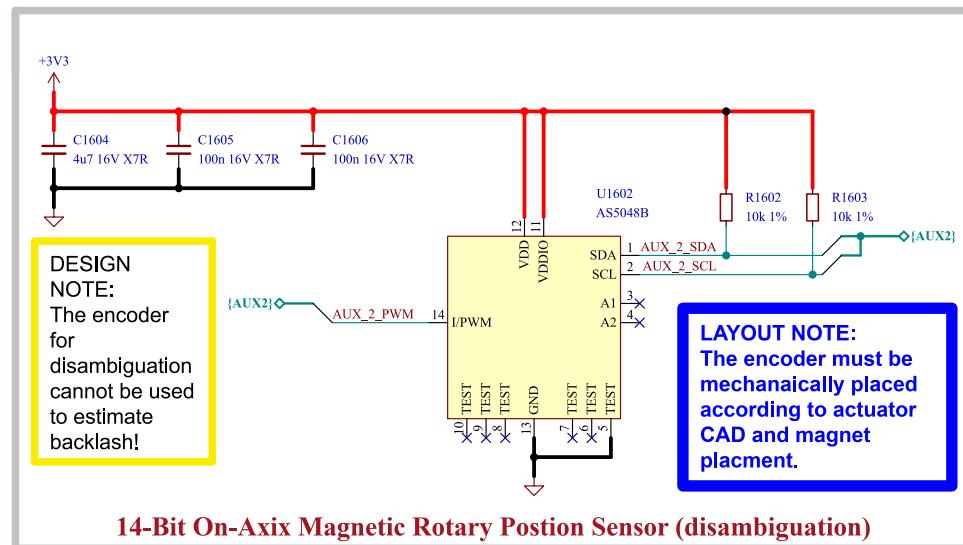


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Sheet Path: /Project Architecture/Sensing - Battery/	Reviewer: Nagy Richárd	Size: <b>A4</b>	Sheet: <b>15 of 25</b>

# [16] Sensing - Position



14-Bit On-Axis Magnetic Rotary Postion Sensor (commutation)

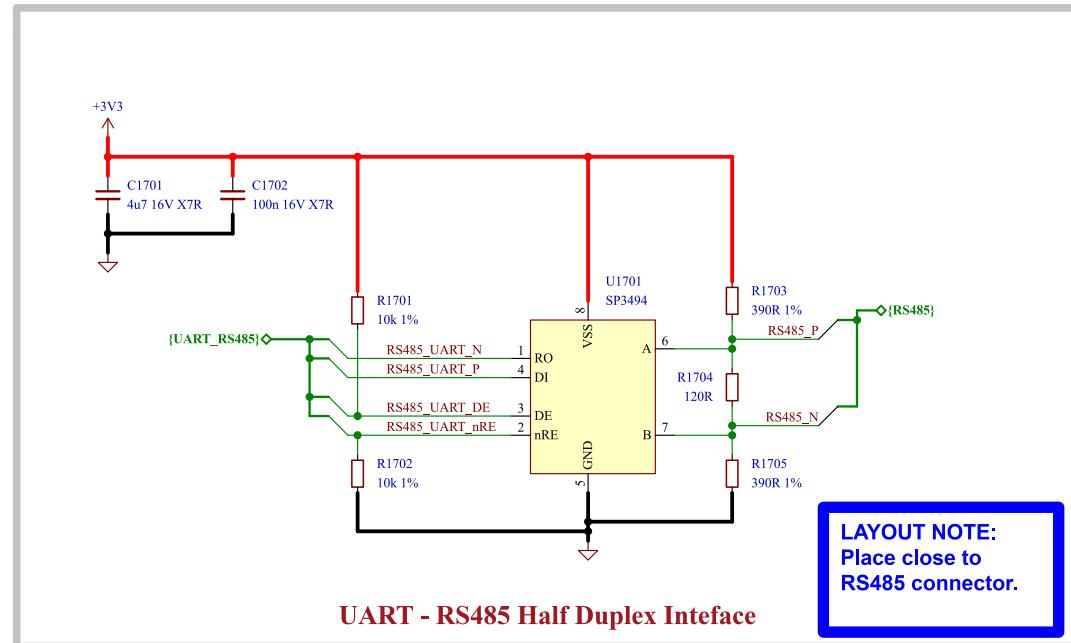


14-Bit On-Axis Magnetic Rotary Postion Sensor (disambiguation)



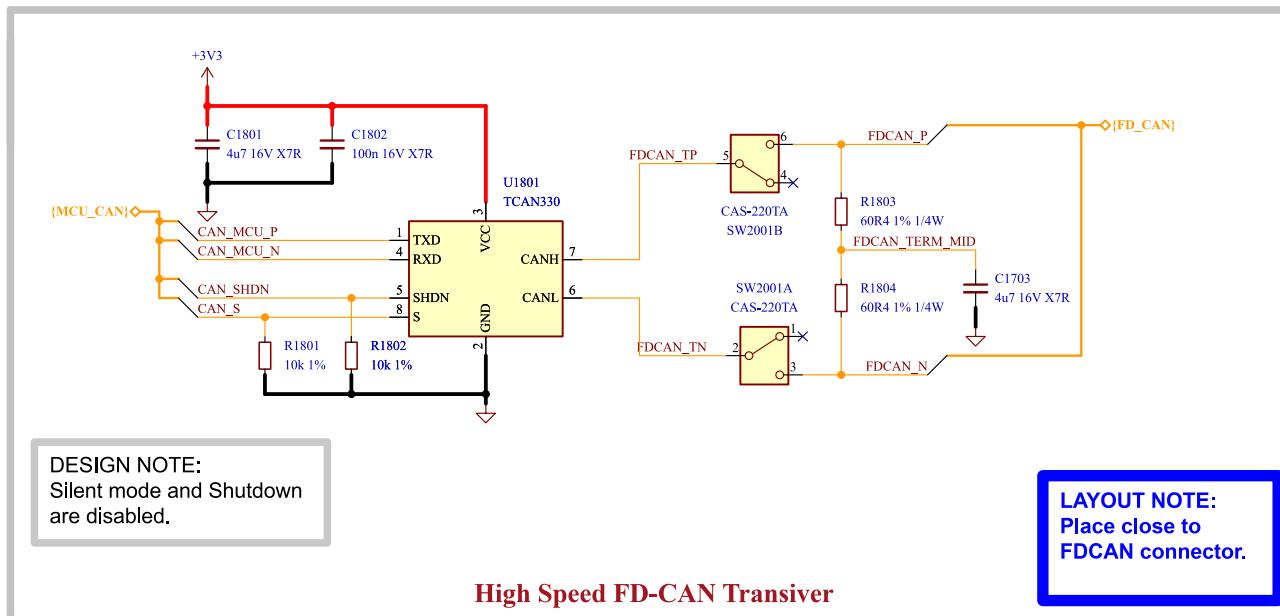
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Sensing - Position	Sensing - Position.kicad_sch	Nagy Richárd	Last Modified Date	1.0
Sheet Path:	Reviewer:	Size:	Sheet:	
/Project Architecture/Sensing - Position/	Nagy Richárd	<b>A4</b>	<b>16</b>	<b>of 25</b>

# [17] Interface - RS845



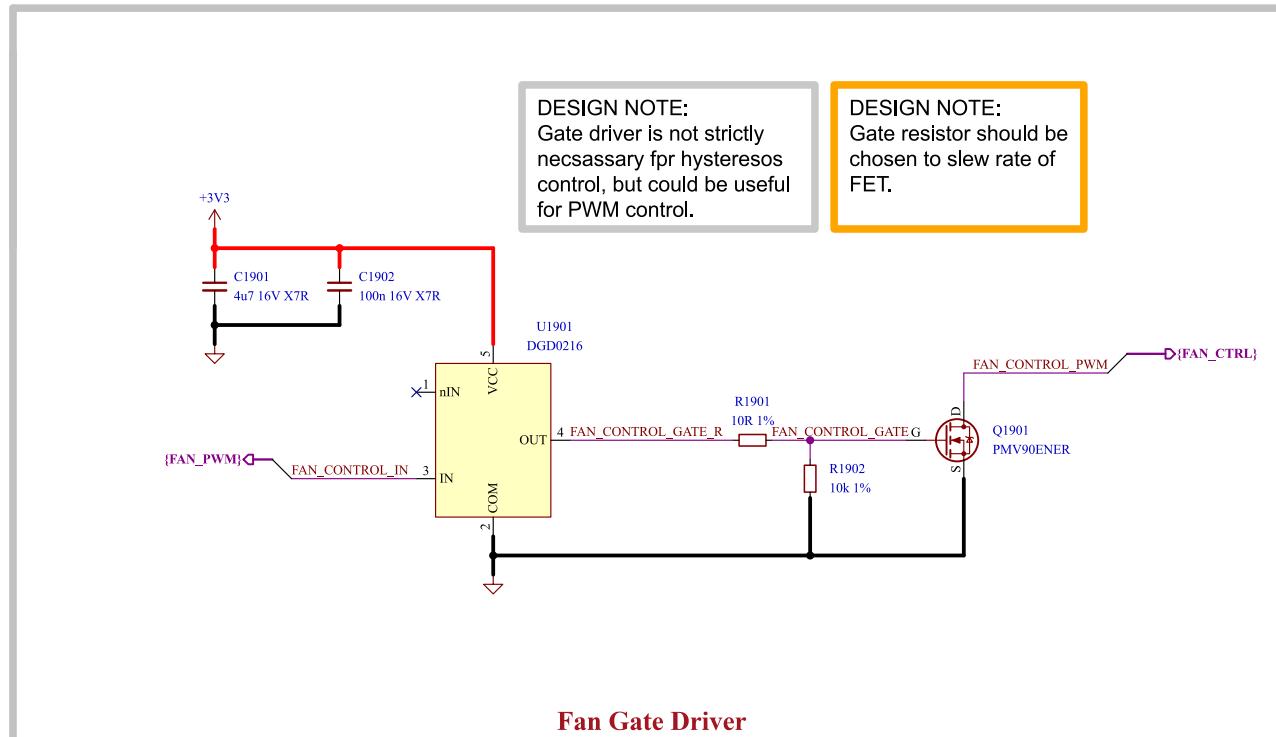
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Board Name:	<b>BLDC motor controller</b>		Project Name: <b>BLDC motor controller</b>	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Interface - RS485	Interface - RS485.kicad_sch	Nagy Richárd	Last Modified Date	1.0
Sheet Path:	Reviewer:	Nagy Richárd	Size:	Sheet: <b>A4</b> <b>17</b> of <b>25</b>
/Project Architecture/Interface - RS485/				

# [18] Interface - FD-CAN



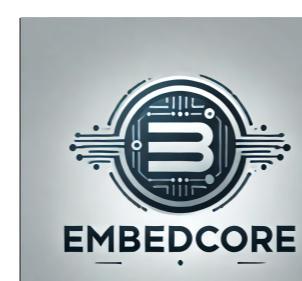
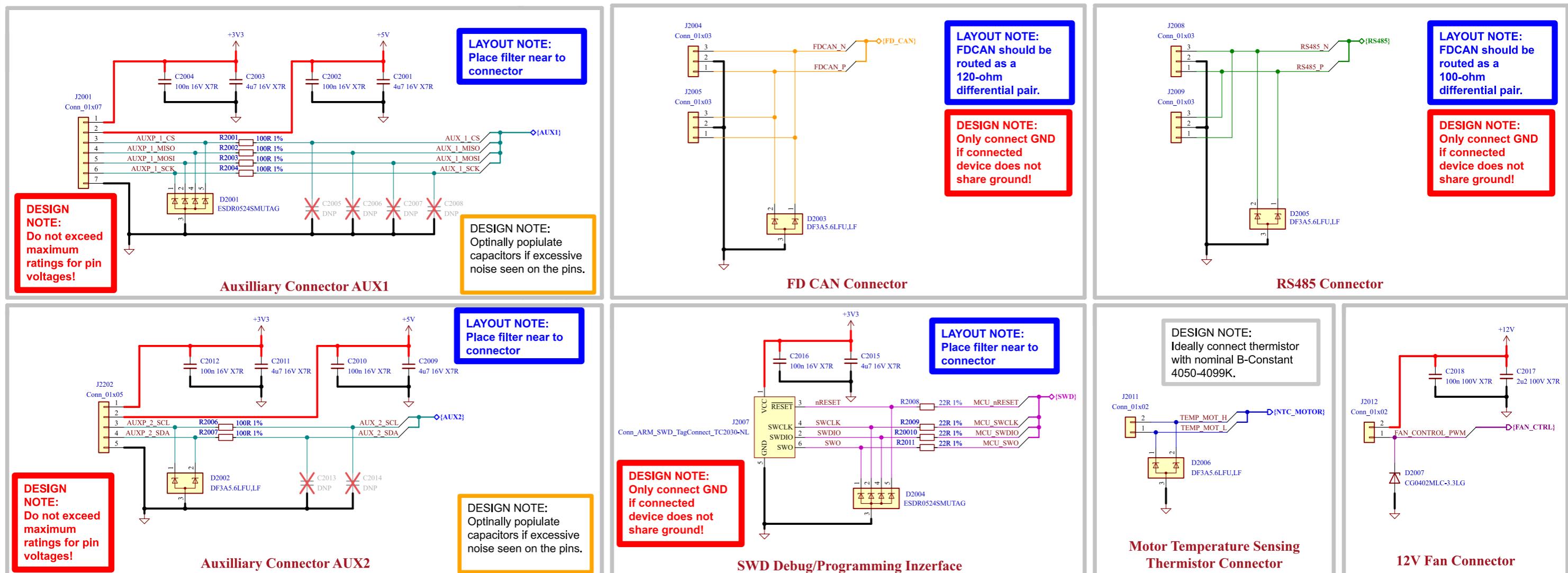
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	Reviewer: Nagy Richárd	Size: <b>A4</b> Sheet: <b>18</b> of <b>25</b>

# [19] Interface - Fan Control



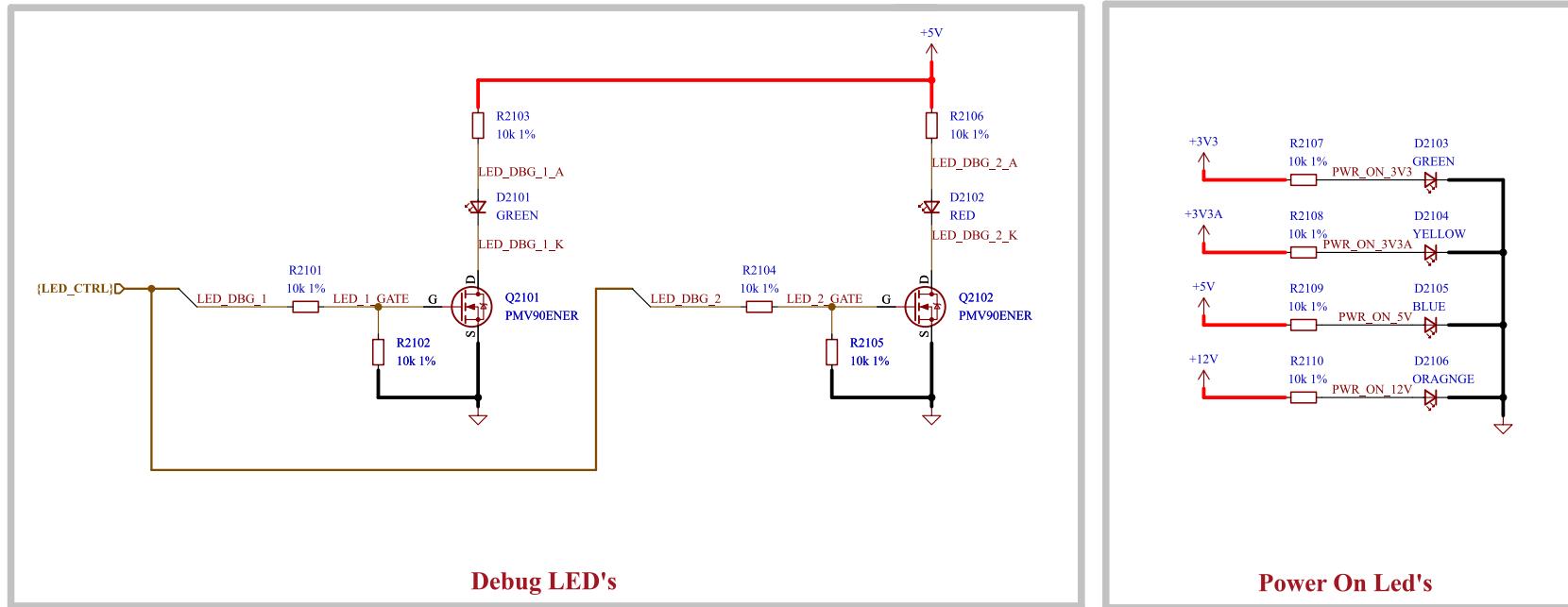
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	Nagy Richárd	1.0
	Size:	Sheet:
	<b>A4</b>	<b>19</b> of <b>25</b>

# [20] Interface - Interconnects



Comments:	Company:	Variant:
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BLDC motor controller	BLDC motor controller	
Sheet Title:	File Name:	Designer:
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Sheet Path:	Reviewer:	Date: Last Modified Date
/Project Architecture/Interface - Interconnects/	Nagy Richárd	1.0
Size:	Sheet:	
A3	20	of 25

# [21] User - LED Indicators



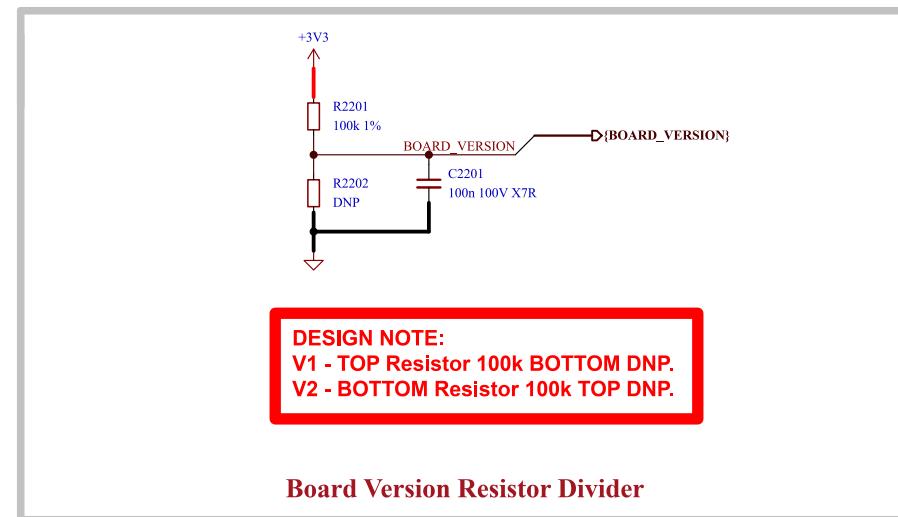
Debug LED's

Power On Led's



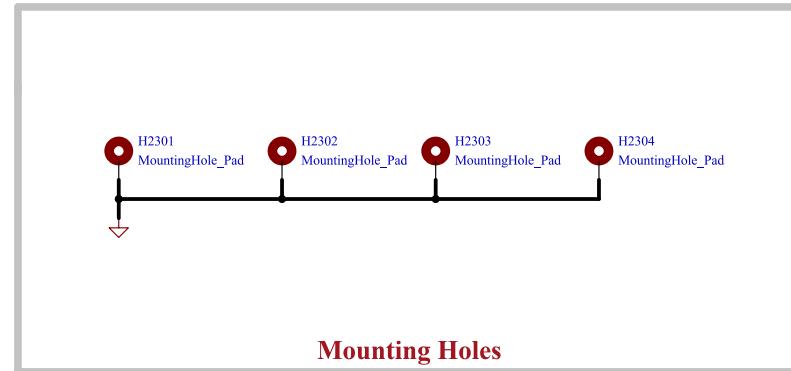
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/Project Architecture/User - LED Indicators/	Nagy Richárd		<b>A4</b>	<b>21</b> of <b>25</b>

# [22] Misc - Board Version, DAC



Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	<b>BLDC motor controller</b>		Project Name:	<b>BLDC motor controller</b>
Sheet Title:	File Name:	Designer:	Date:	Revision:
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/Project Architecture/Misc - Board Version, DAC/	Nagy Richárd		<b>A4</b>	<b>22 of 25</b>

# [23] Misc - Holes, Fiducials



Comments:	Company: EmbedCore	Variant: CHECKED
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Sheet Title: Misc - Holes, Fiducials	File Name: Misc - Holes, Fiducials.kicad_sch	Designer: Nagy Richárd
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Size: <b>A4</b>		Sheet: <b>23 of 25</b>

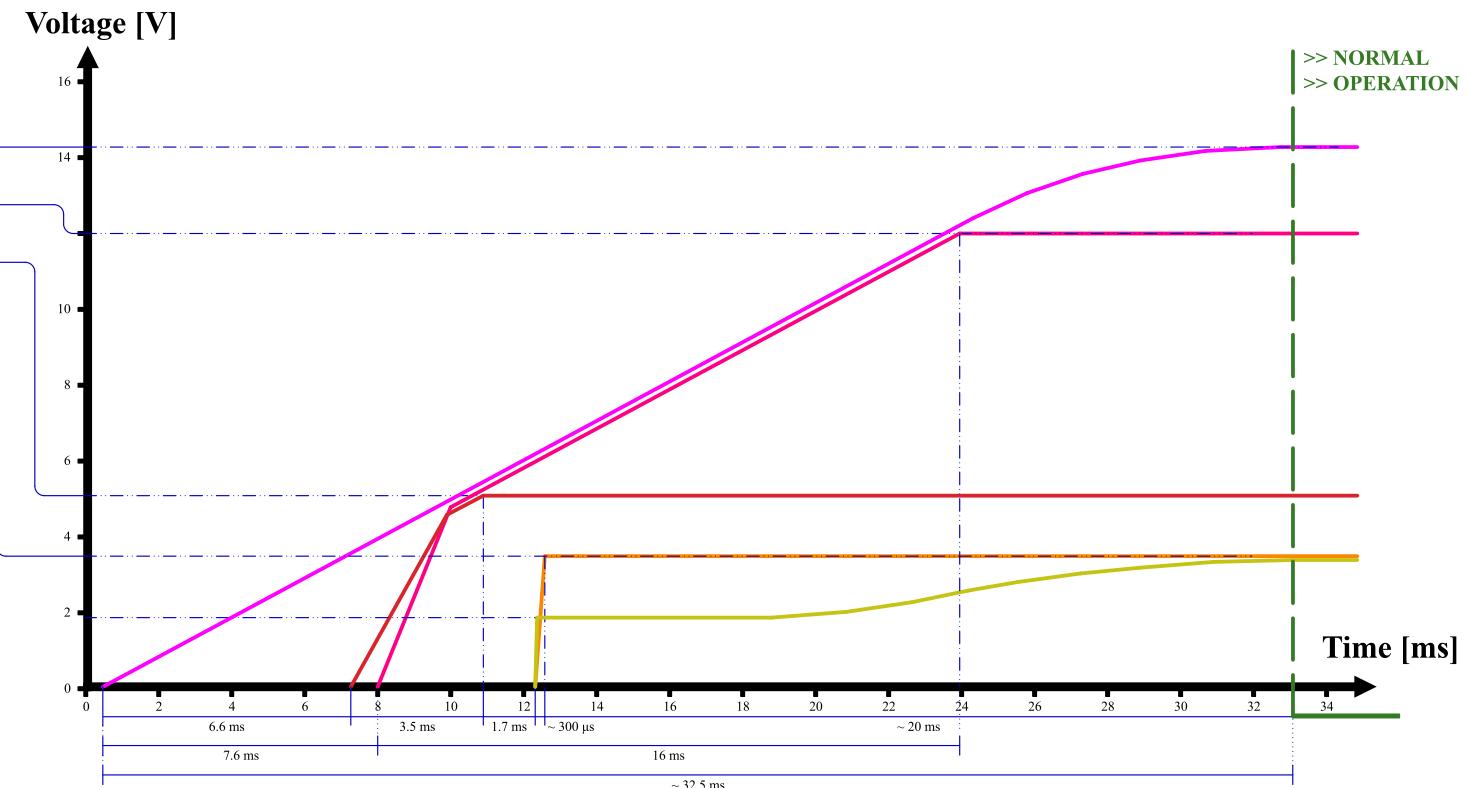
# [24] Power - Sequencing

A

NAME	SOURCE	LEVEL
+VBAT	BATTERY	12 - 44V
+12V	LMR36006	12V ± 1.5%
+5V	LMR36506	5V ± 1.5%
+3V3	TPS62172	3.3V ± 3%
+A3V3	LP2992	3.3V ± 0.5%

DESIGN NOTE:  
Power sequencing graph measured experimentally.

DESIGN NOTE:  
Start-up time of 12V rail depends on +VBAT charging time, which itself depends on the precharge circuit.



Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	<b>BLDC motor controller</b>		Project Name: <b>BLDC motor controller</b>	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Power - Sequencing	Power - Sequencing.kicad_sch	Nagy Richárd	Last Modified Date	1.0
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/Power - Sequencing/	Nagy Richárd		<b>A4</b>	<b>24</b> of <b>25</b>

1

2

3

4

5

6

A

B

C

D

2

3

4

5

6

# [25] Revision History



Comments:	Company: <b>EmbedCore</b>	Variant: <b>CHECKED</b>		
	Board Name: <b>BLDC motor controller</b>	Project Name: <b>BLDC motor controller</b>		
Sheet Title: Revision History	File Name: Revision History.kicad_sch	Designer: Nagy Richárd	Date: Last Modified Date	Revision: 1.0
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