

BLDC motor controller

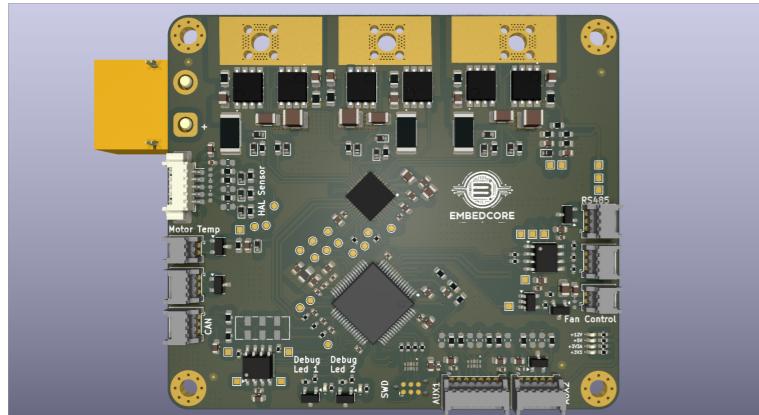
2025-03-01

Variant: **CHECKED**

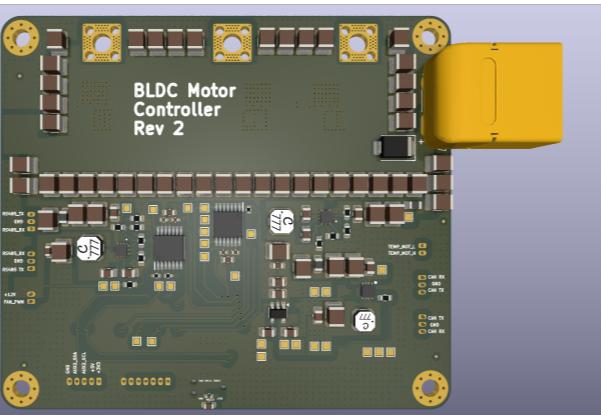
Rev 1.0

Page	Index	Page	Index	Page	Index	Page	Index
1	Cover Page	11	Motor Control - Inverter - Phase A	21	User - LED Indicators	31
2	Block Diagram	12	Motor Control - Inverter - Phase B	22	Misc - Board Version, DAC	32
3	Project Architecture	13	Motor Control - Inverter - Phase C	23	Misc - Hoes, Fiducials	33
4	Powert Generation - Connector	14	Sensing - Temperature	24	Power - Sequencing	34
5	Power Generation - Bulk Capacitors	15	Sensing - Battery	25	Revision History	35
6	Power Generation - Buck Converter	16	Sensing - Position	26	36
7	Power Generation - LDO	17	Interface - RS485	27	37
8	MCU - PWR	18	Interface - FD-CAN	28	38
9	MCU - I/O	19	Interface - Fan Control	29	39
10	Motor Control - Top Level	20	Interface - Interconnects	30	40

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 - 2025-03-01

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.

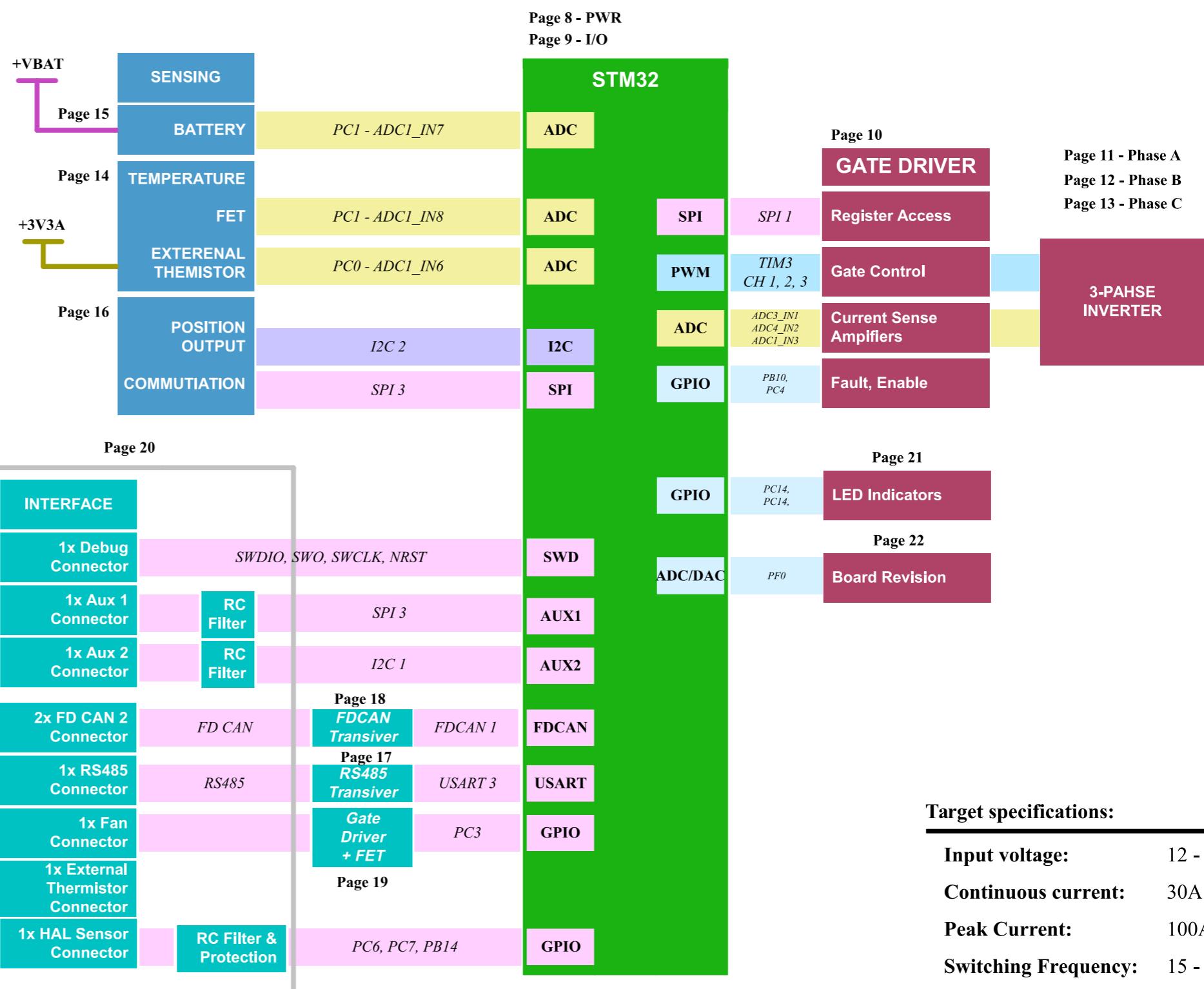
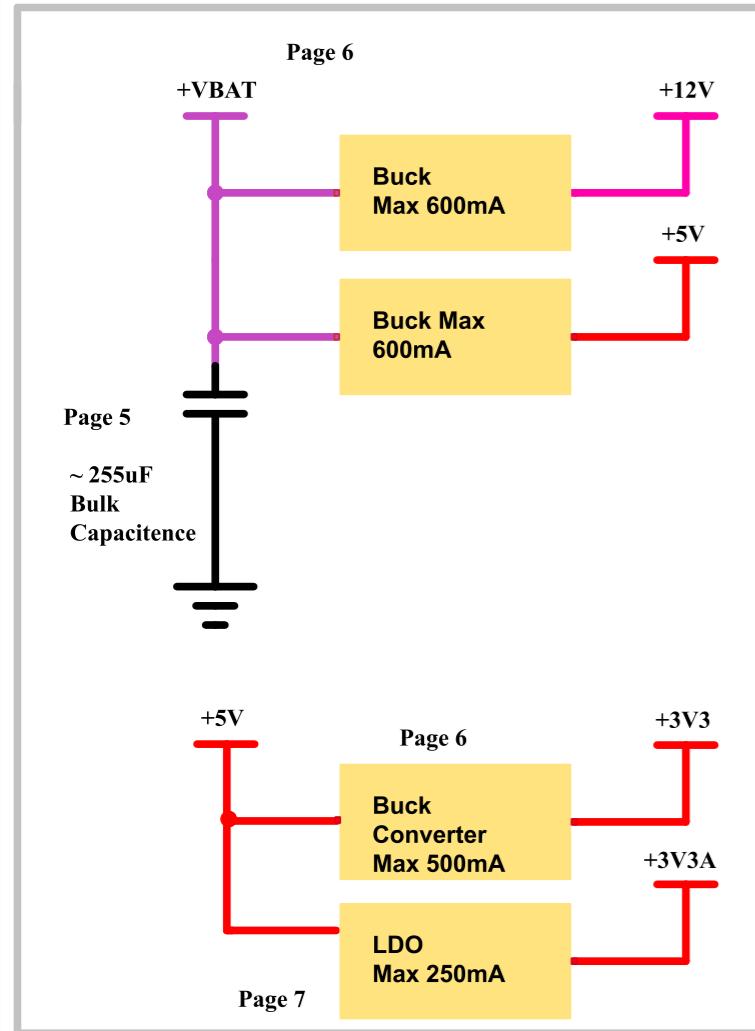
DESIGN NOTE:
Example text for critical design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.



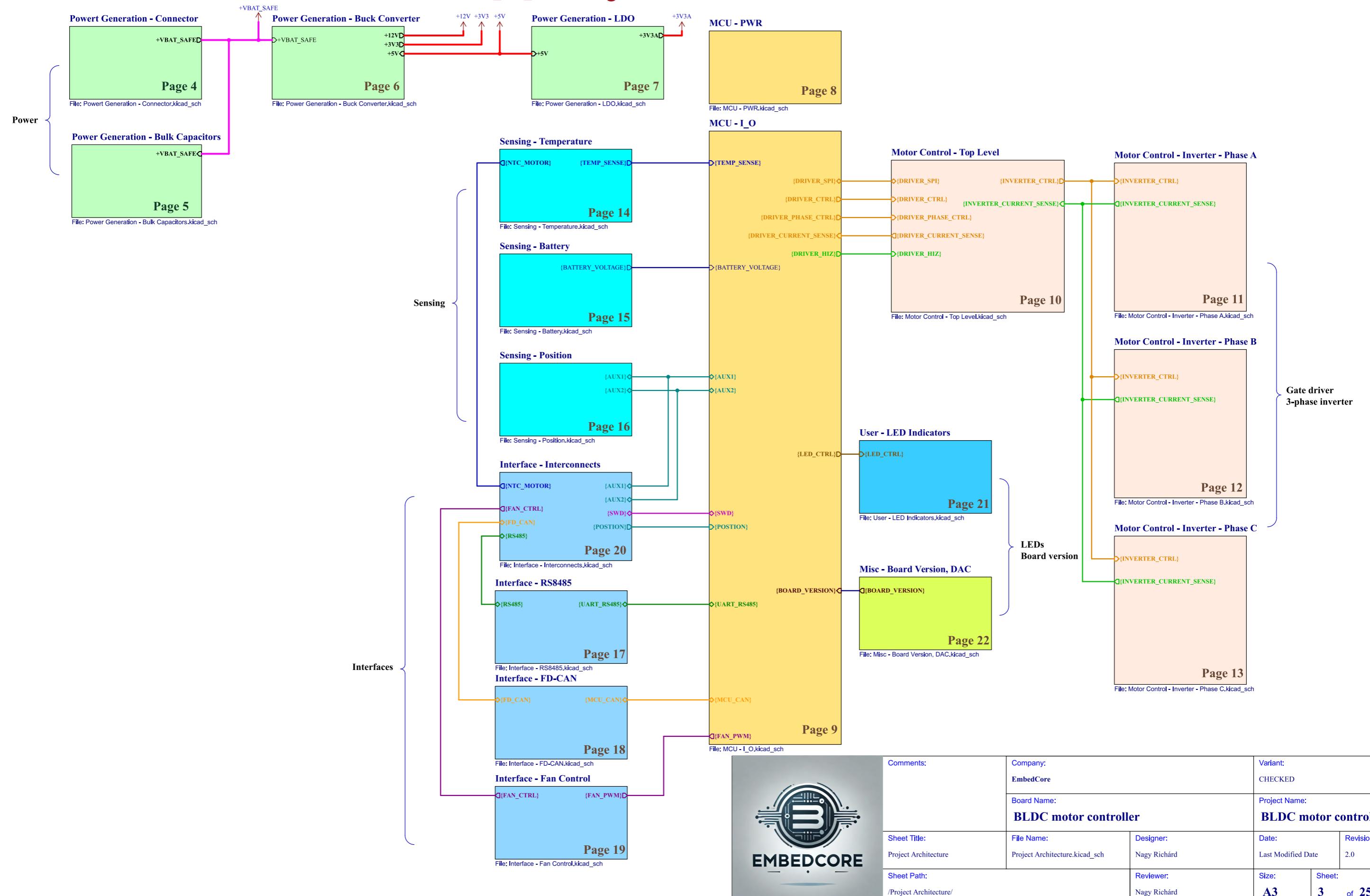
Comments:	Company: EmbedCore		Variant: CHECKED
Board Name:	BLDC motor controller		Project Name: BLDC motor controller
Sheet Title: Cover Page	File Name: BLDC motor controller.kicad_sch	Designer: Nagy Richárd	Date: Last Modified Date 2.0
Sheet Path: /	Reviewer: Nagy Richárd	Size: A3	Sheet: 1 of 25

[2] Block Diagram

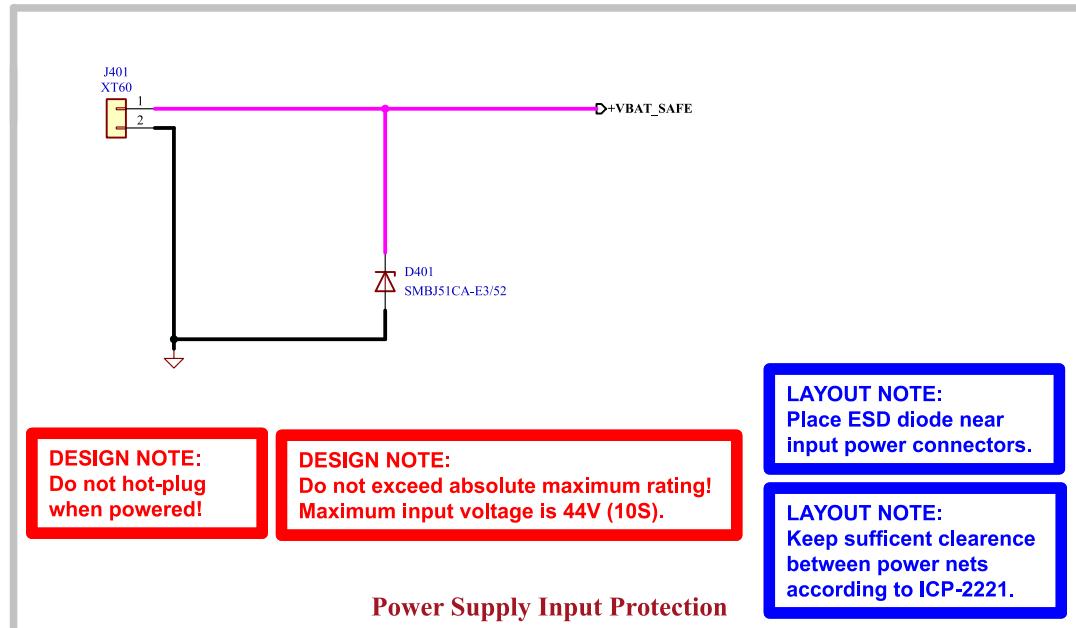


Comments:	Company:	Variant:
	EmbedCore	CHECKED
Board Name:	Project Name:	
BLDC motor controller	BLDC motor controller	
Sheet Title:	File Name:	Revision:
Block Diagram	Block Diagram.kicad_sch	Date: Last Modified Date 2.0
Sheet Path:	Reviewer:	Size:
/Block Diagram/	Nagy Richárd	A3
		Sheet: 2 of 25

[3] Project Architecture

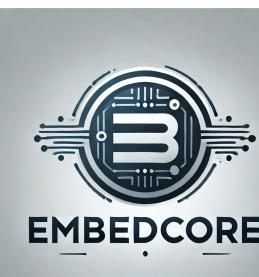
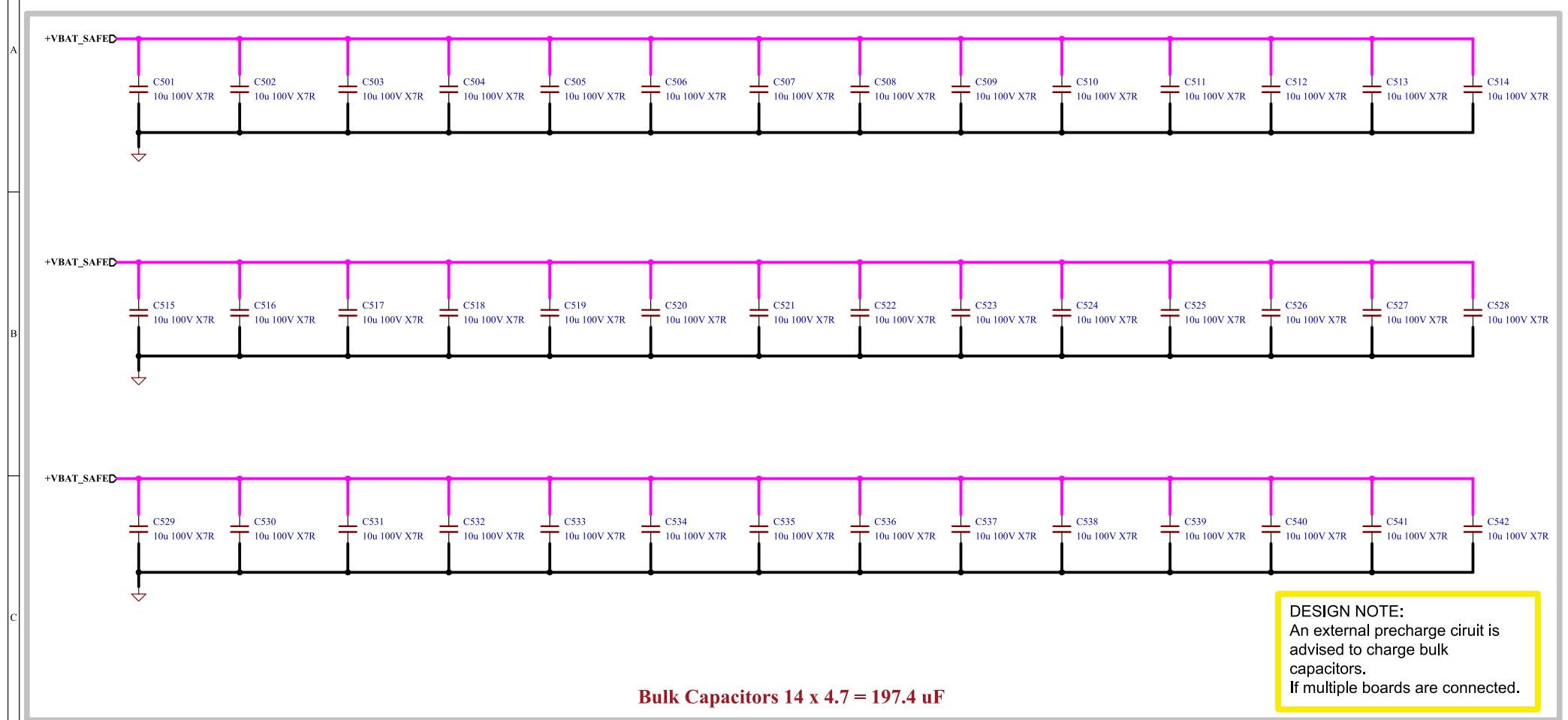


[4] Powert Generation - Connector



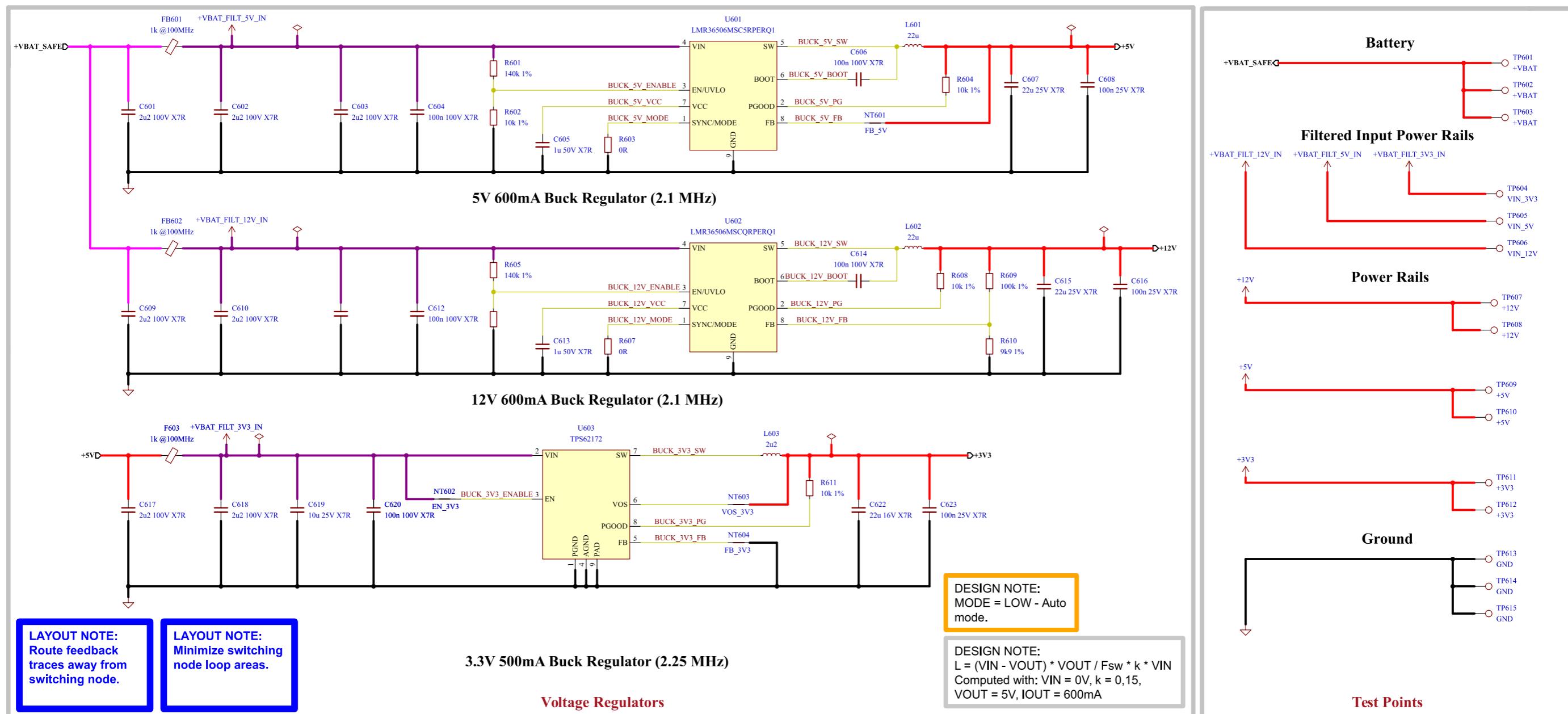
Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name:	BLDC motor controller
Sheet Title:	File Name:	Designer:	Date:	Revision:
Powert Generation - Connector	Powert Generation - Connector.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Project Architecture/Powert Generation - Connector/	Nagy Richárd		A4	4 of 25

[5] Power Generation - Bulk Capacitors



Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Power Generation - Bulk Capacitors	Power Generation - Bulk Capacitors.kicad_pcb	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Project Architecture/Power Generation - Bulk Capacitors/	Nagy Richárd		A4	5 of 25

[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:
Power Generation - Buck Converter

File Name:
Power Generation - Buck Converter.kicad_pcb

Designer:
Nagy Richárd

Date:
Last Modified Date

Revision:
2.0

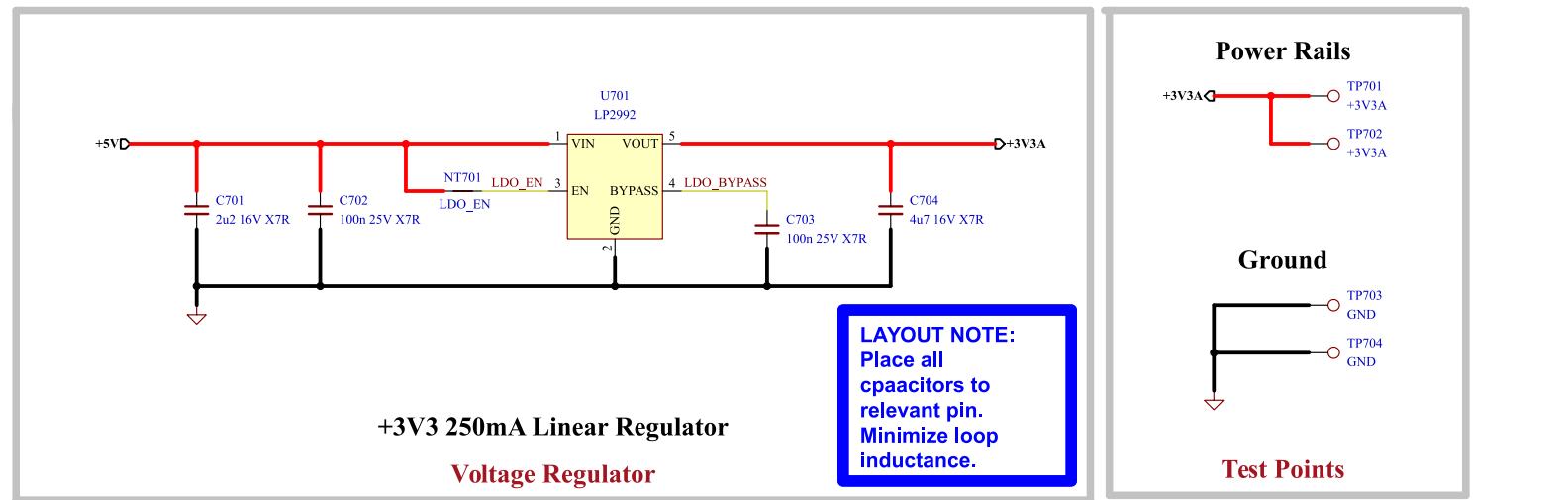
Sheet Path:
/Project Architecture/Power Generation - Buck Converter/

Reviewer:
Nagy Richárd

Size:
A3

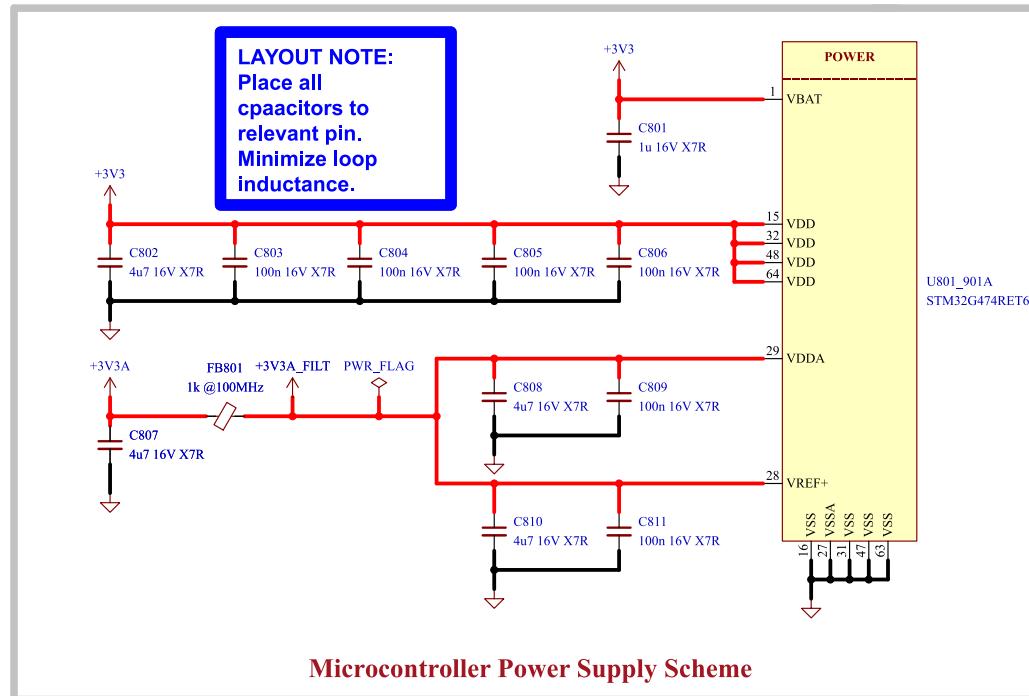
Sheet:
6 of 25

[7] Power Generation - LDO



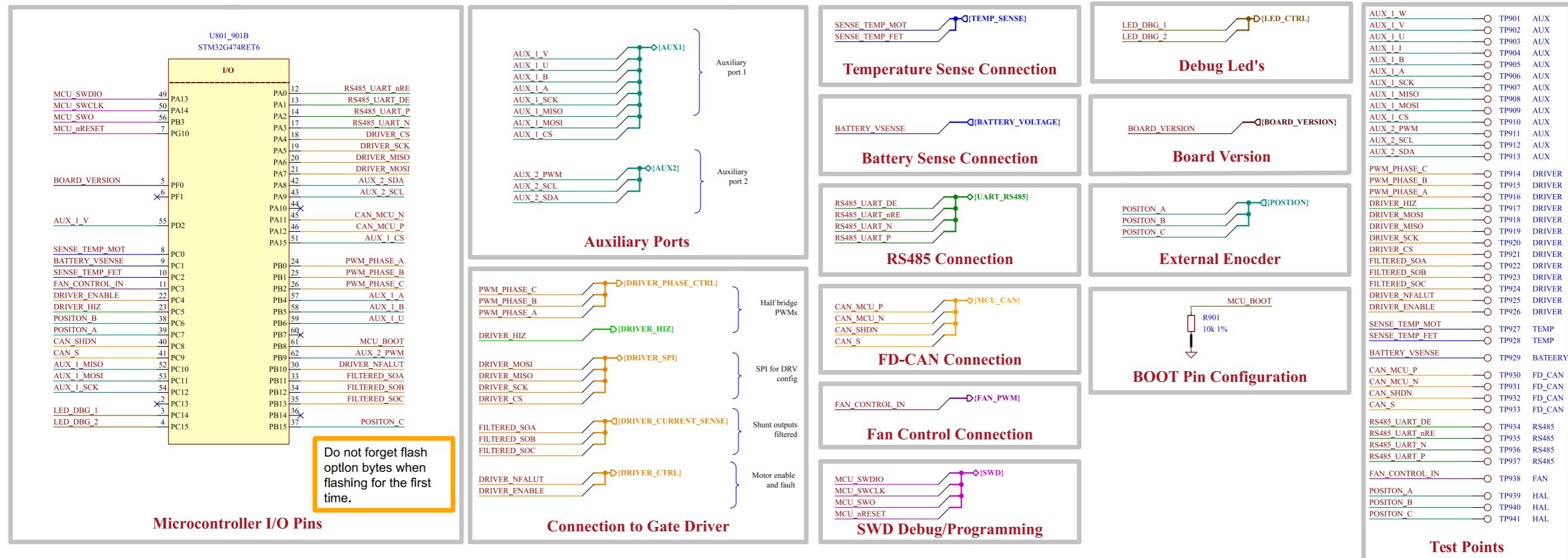
Comments: +3V3A - Analouge 3V3	Company: EmbedCore	Variant: CHECKED
Board Name: BLDC motor controller	Project Name: BLDC motor controller	
Sheet Title: Power Generation - LDO	File Name: Power Generation - LDO.kicad_sch	Designer: Nagy Richárd
Sheet Path: /Project Architecture/Power Generation - LDO/	Reviewer: Nagy Richárd	Date: Last Modified Date Revision: 2.0

[8] MCU - PWR



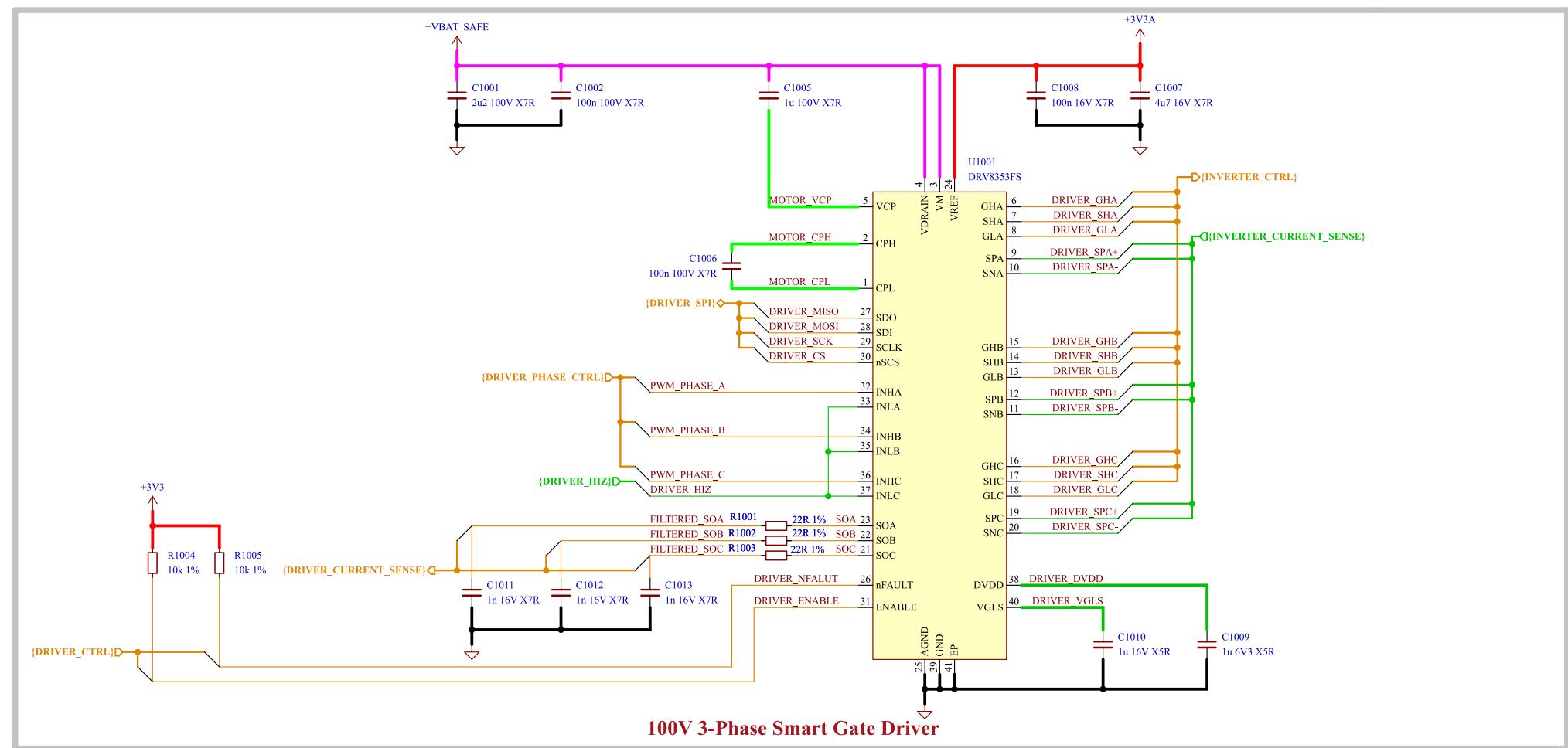
Comments:	Company: EmbedCore		Variant: CHECKED
Board Name:	BLDC motor controller		
Sheet Title:	File Name:	Designer:	Date: Last Modified Date
MCU - PWR	MCU - PWR.kicad_sch	Nagy Richárd	2.0
Sheet Path:	Reviewer:		Size: A4
/Project Architecture/MCU - PWR/	Nagy Richárd		Sheet: 8 of 25

[9] MCU - I/O



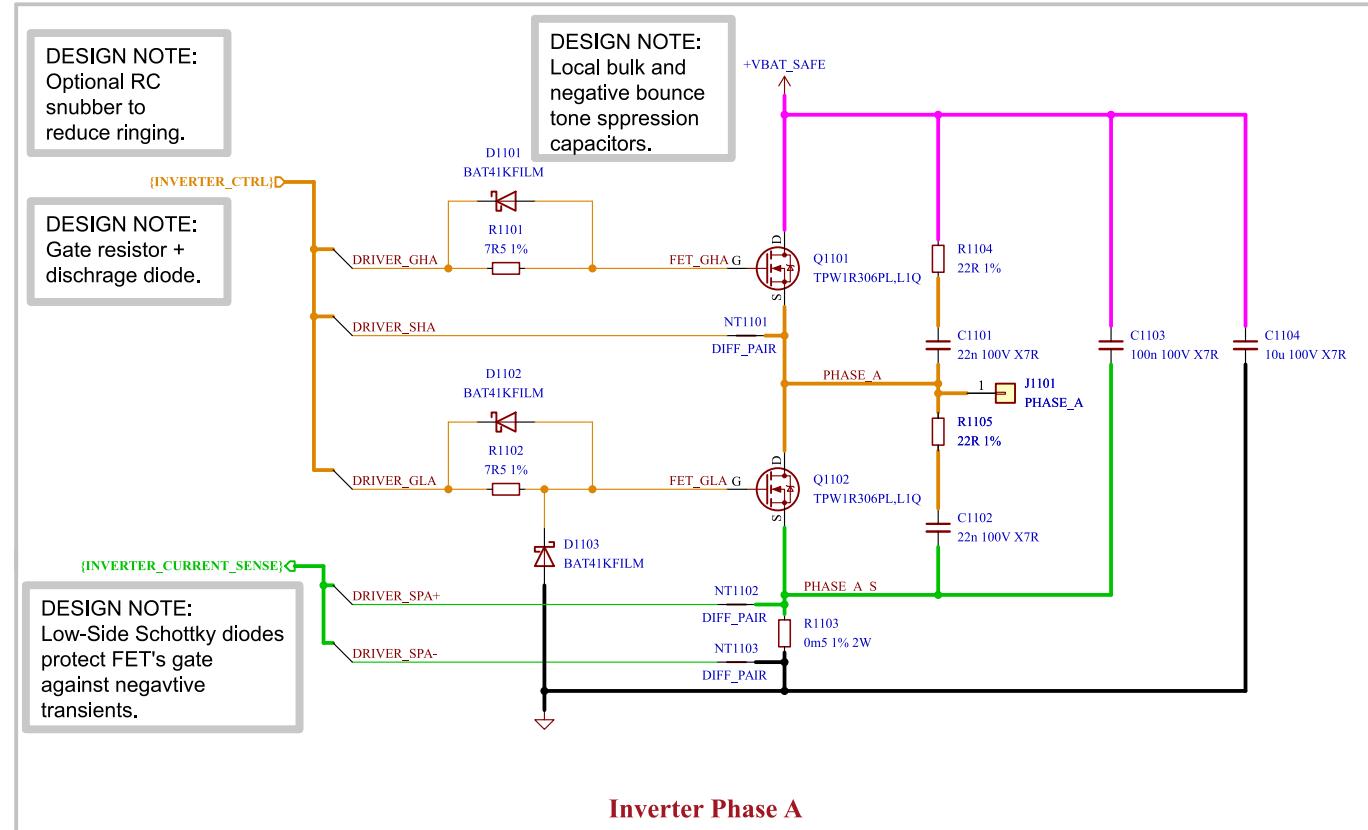
Comments: EmbedCore	Company: BLDC motor controller	Variant: CHECKED
Board Name: BLDC motor controller	Project Name: BLDC motor controller	
Sheet Title: MCU - I/O	File Name: MCU - I_O.kicad_sch	Date: Last Modified Date 2.0
Sheet Path: /Project Architecture/MCU - I_O/	Reviewer: Nagy Richárd	Size: A3
		Sheet: 9 of 25

[10] Motor Control - Top Level



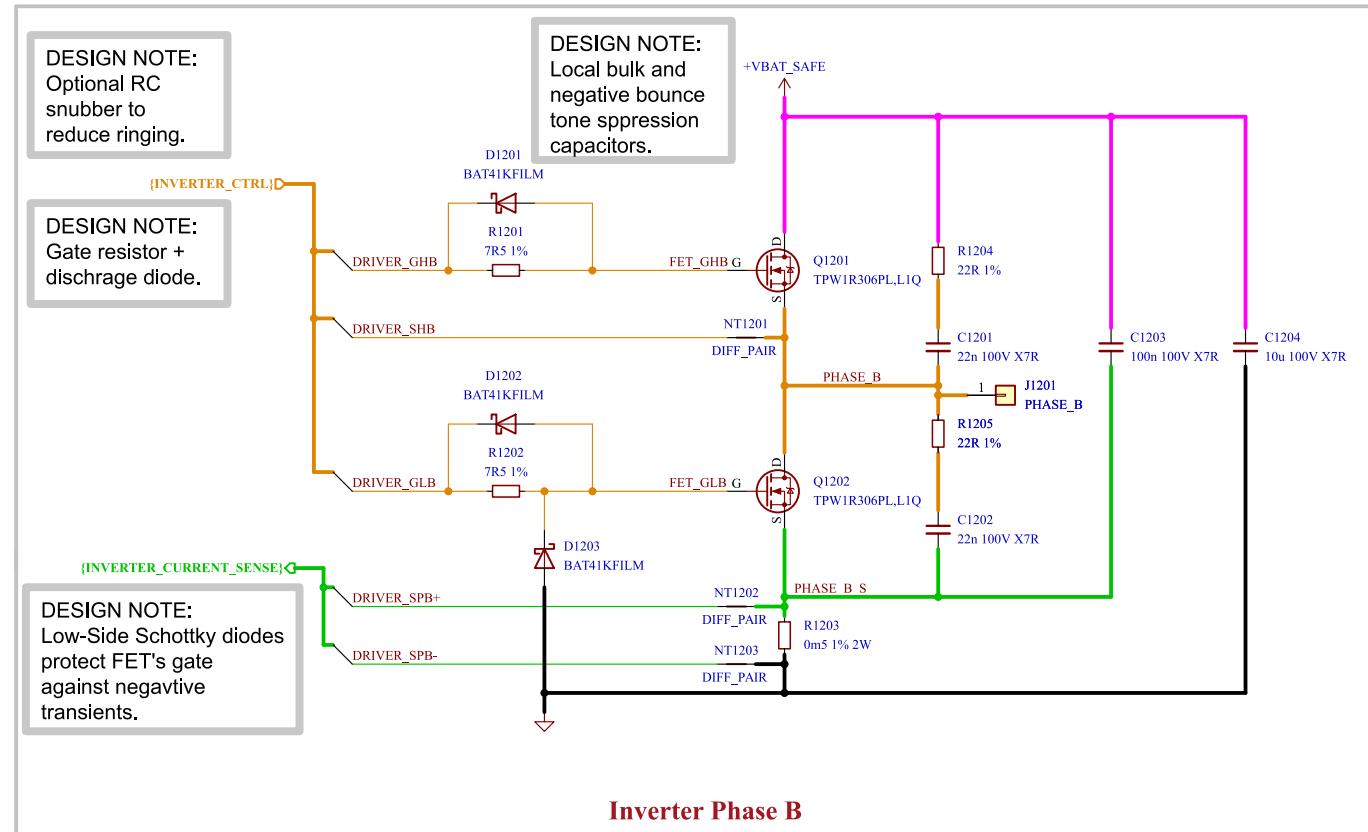
Comments:	Company:	Variant:
	EmbedCore	CHECKED
Board Name:	BLDC motor controller	
Sheet Title:	File Name:	Project Name:
Motor Control - Top Level	Motor Control - Top Level.kicad_sch	BLDC motor controller
Sheet Path:	Designer:	Date:
/Project Architecture/Motor Control - Top Level/	Nagy Richárd	Last Modified Date
	Reviewer:	Revision:
	Nagy Richárd	2.0
	Size:	Sheet:
	A4	10 of 25

[11] Motor Control - Inverter - Phase A



Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Motor Control - Inverter - Phase A	Motor Control - Inverter - Phase A.kicad	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Project Architecture/Motor Control - Inverter - Phase A/	Nagy Richárd		A4	11 of 25

[12] Motor Control - Inverter - Phase B



Comments:

Company:
EmbedCore

Variant:
CHECKED

Board Name:

BLDC motor controller

Project Name:

BLDC motor controller

Sheet Title:

Motor Control - Inverter - Phase B

File Name:

Motor Control - Inverter - Phase B.kicad_Nagy Richárd

Designer:

Nagy Richárd

Date:

Last Modified Date 2.0

Sheet Path:

/Project Architecture/Motor Control - Inverter - Phase B/

Reviewer:

Nagy Richárd

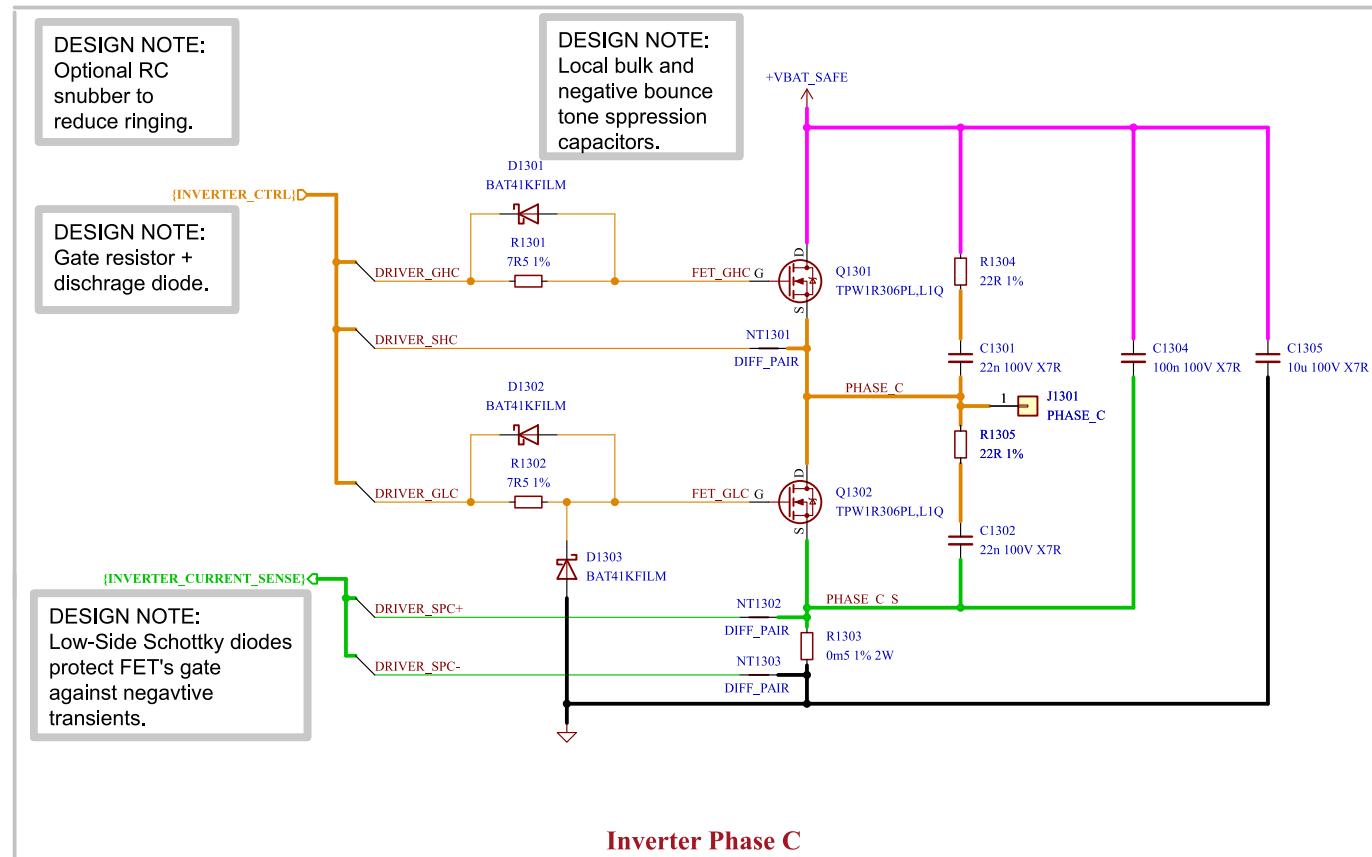
Size:

A4

Sheet:

12 of 25

[13] Motor Control - Inverter - Phase C



Comments:

Company:
EmbedCore

Variant:
CHECKED

Board Name:

BLDC motor controller

Project Name:

BLDC motor controller

Sheet Title:

Motor Control - Inverter - Phase C

File Name:

Motor Control - Inverter - Phase C.kicad_Nagy Richárd

Designer:

Nagy Richárd

Date:

Last Modified Date 2.0

Sheet Path:

/Project Architecture/Motor Control - Inverter - Phase C/

Reviewer:

Nagy Richárd

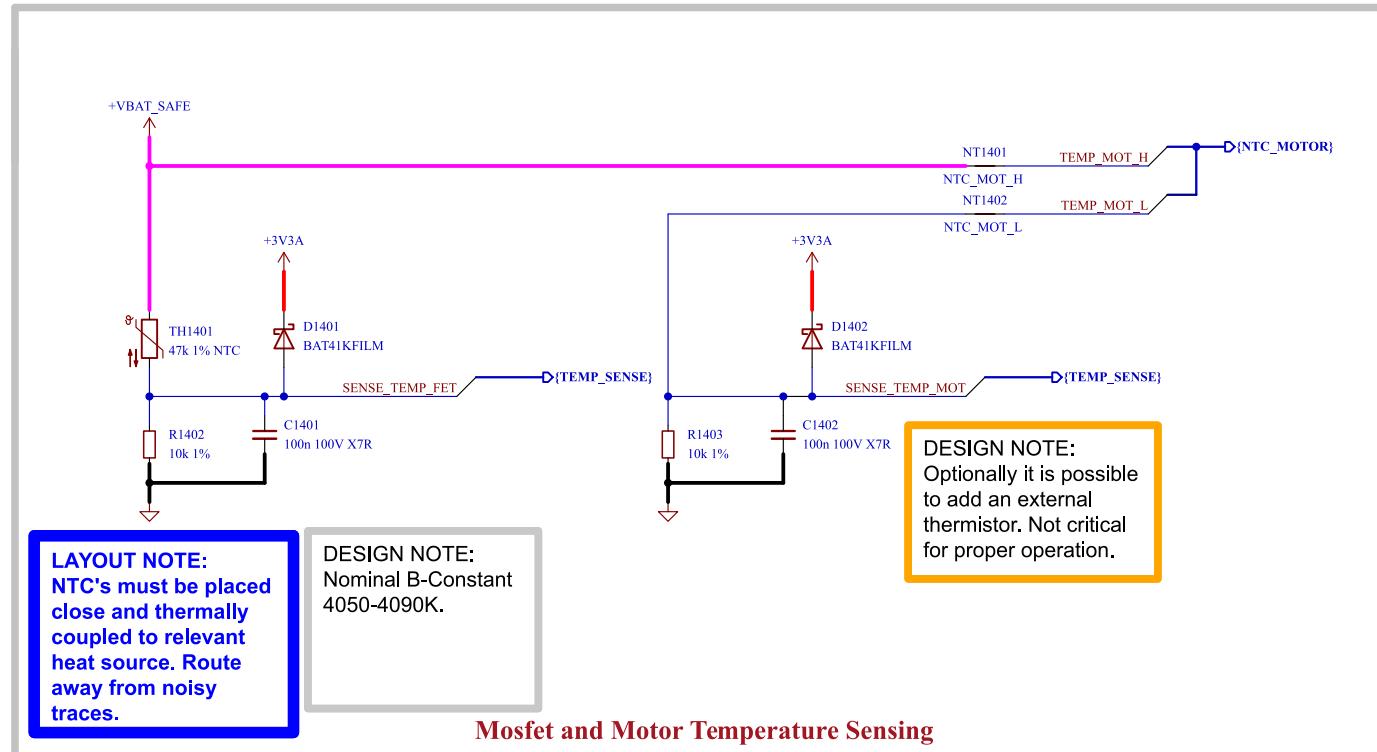
Size:

A4

Sheet:

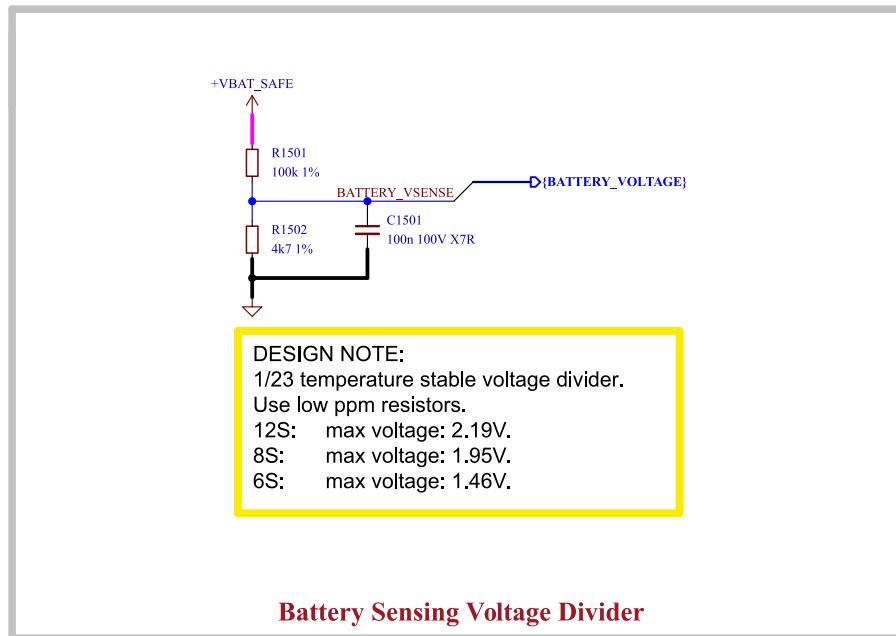
13 of 25

[14] Sensing - Temperature



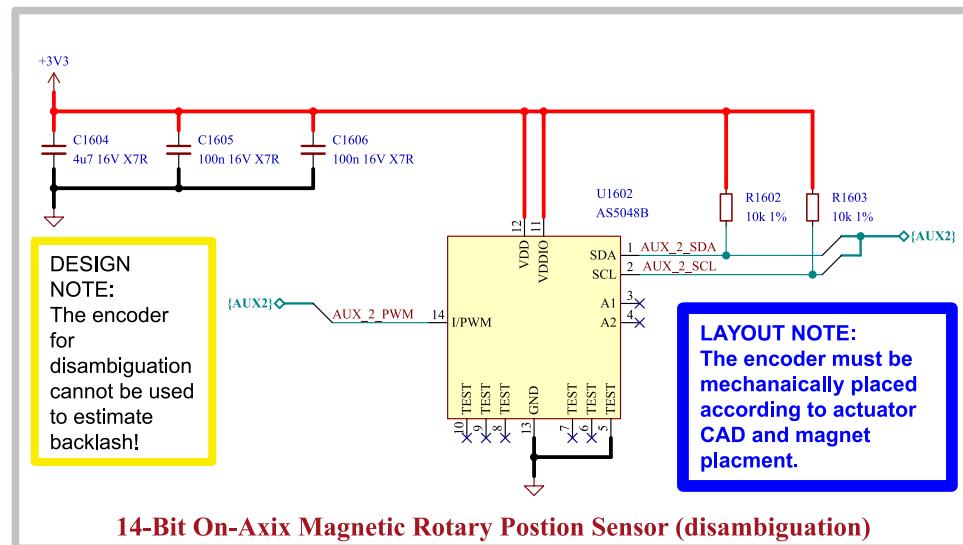
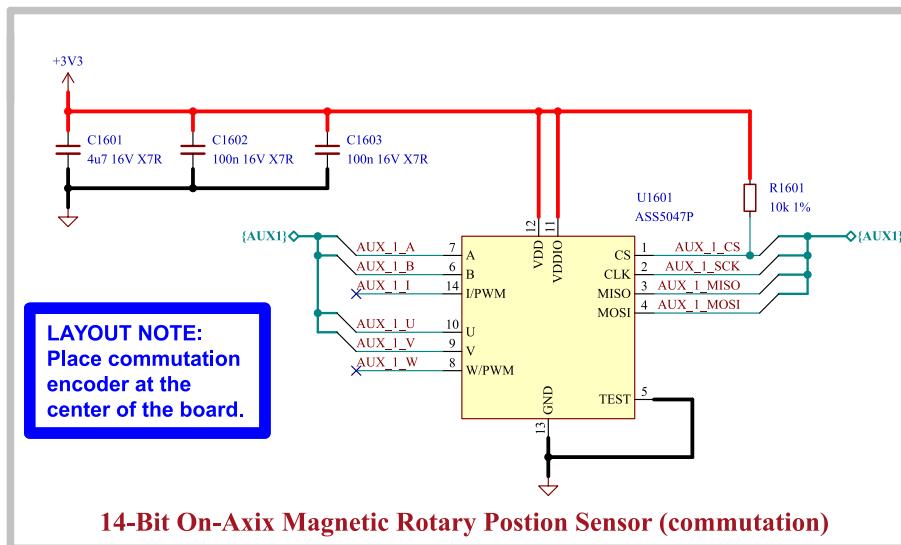
Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Sensing - Temperature	Sensing - Temperature.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Project Architecture/Sensing - Temperature/	Nagy Richárd		A4	14 of 25

[15] Sensing - Battery



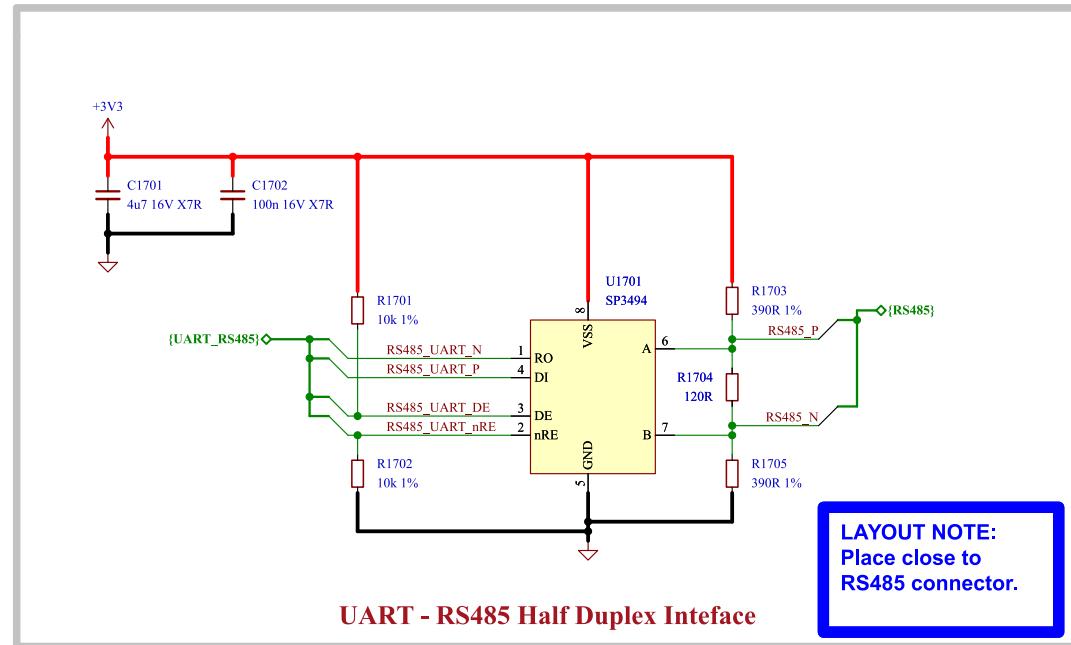
Comments:	Company: EmbedCore		Variant: CHECKED
Board Name: BLDC motor controller	Project Name: BLDC motor controller		
Sheet Title: Sensing - Battery	File Name: Sensing - Battery.kicad_sch	Designer: Nagy Richárd	Date: Last Modified Date Revision: 2.0
Sheet Path: /Project Architecture/Sensing - Battery/	Reviewer: Nagy Richárd	Size: A4	Sheet: 15 of 25

[16] Sensing - Position



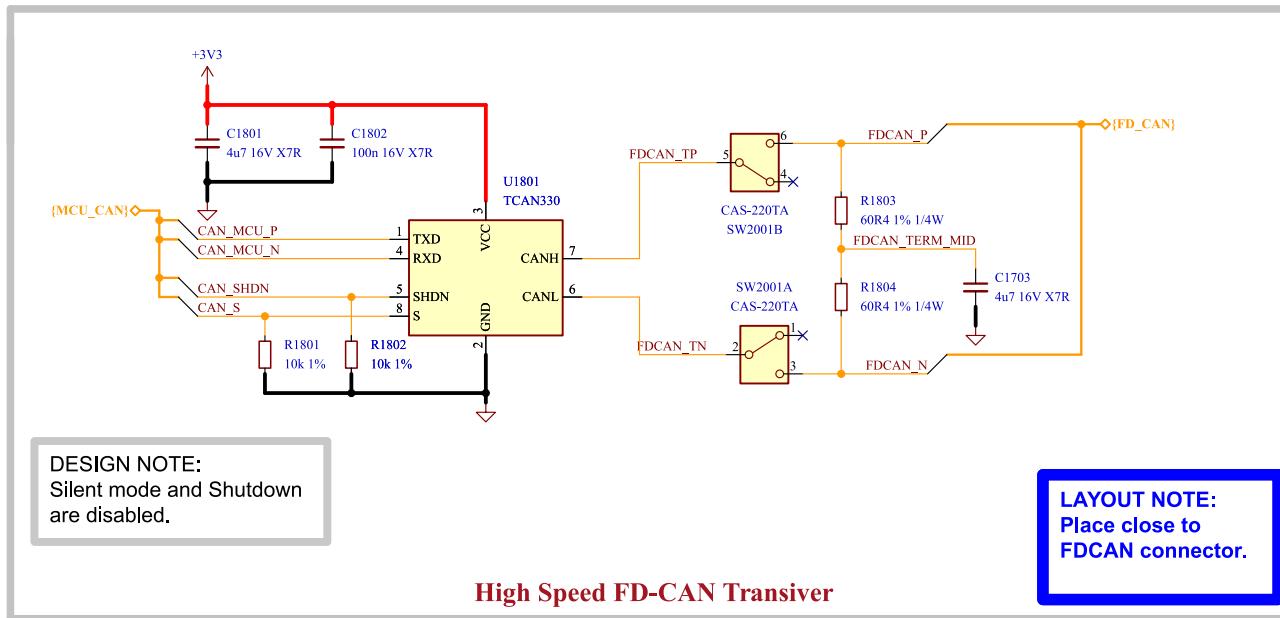
Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Sensing - Position	Sensing - Position.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:	Size:	Sheet:	
/Project Architecture/Sensing - Position/	Nagy Richárd	A4	16	of 25

[17] Interface - RS845



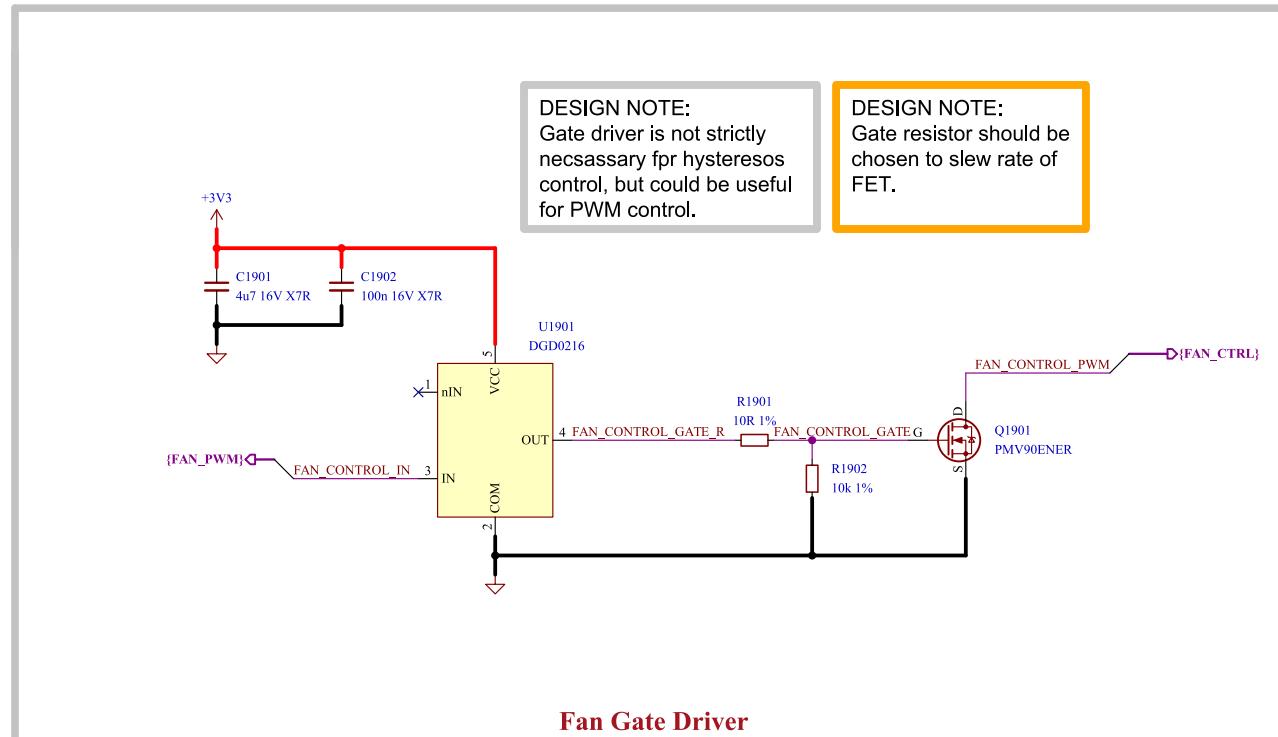
Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Interface - RS485	Interface - RS485.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:	Size:	Sheet:	
/Project Architecture/Interface - RS485/	Nagy Richárd	A4	17 of 25	

[18] Interface - FD-CAN



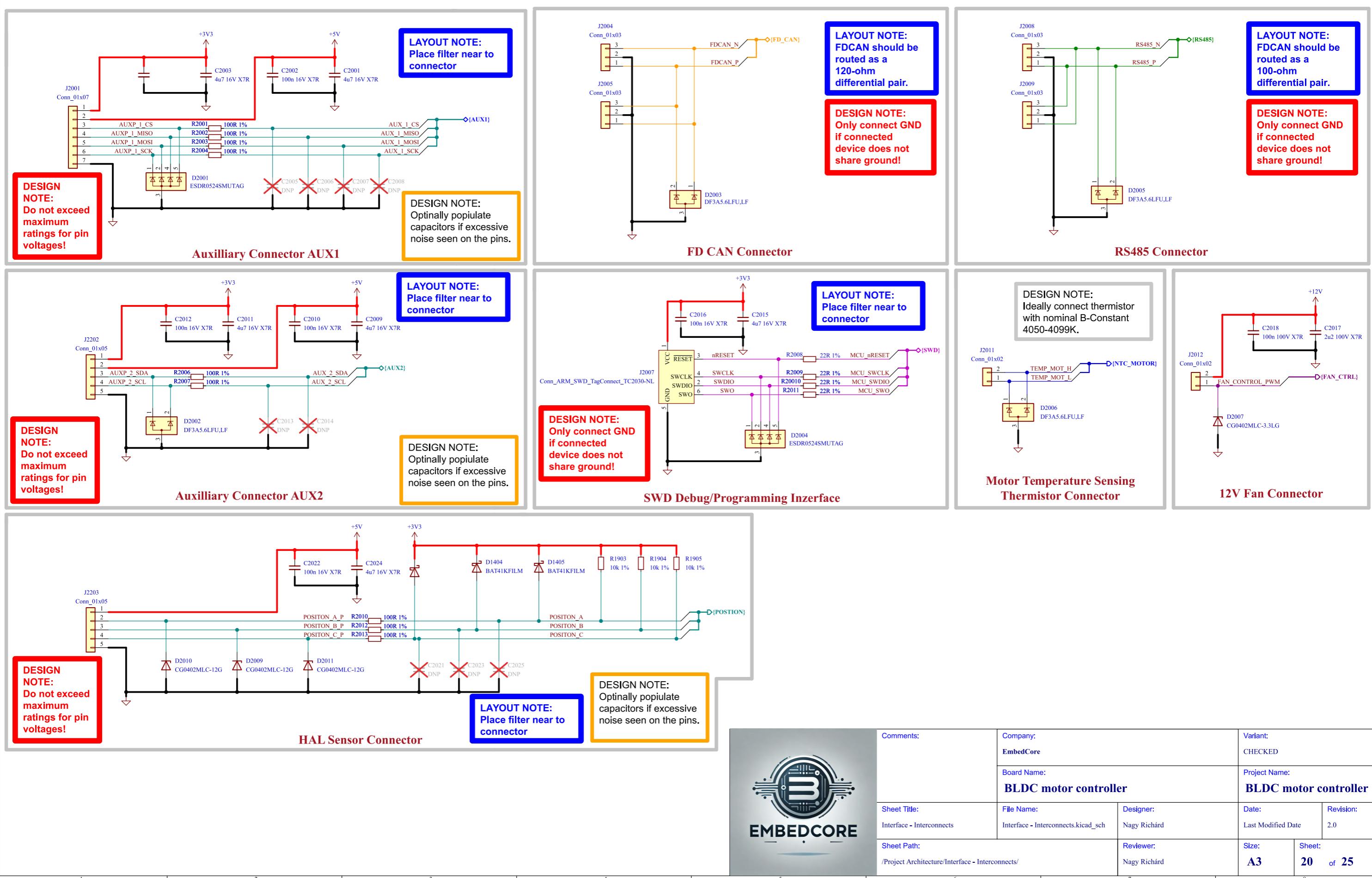
Comments: Sheet Title: Sheet Title B	Company: Board Name: BLDC motor controller	Variant: Project Name: BLDC motor controller
Sheet Path: /Project Architecture/Interface - FD-CAN/	File Name: Interface - FD-CAN.kicad_sch Designer: Nagy Richárd	Date: Last Modified Date Revision: Interface - FD-CAN
	Reviewer: Nagy Richárd	Size: A4 Sheet: 18 of 25

[19] Interface - Fan Control

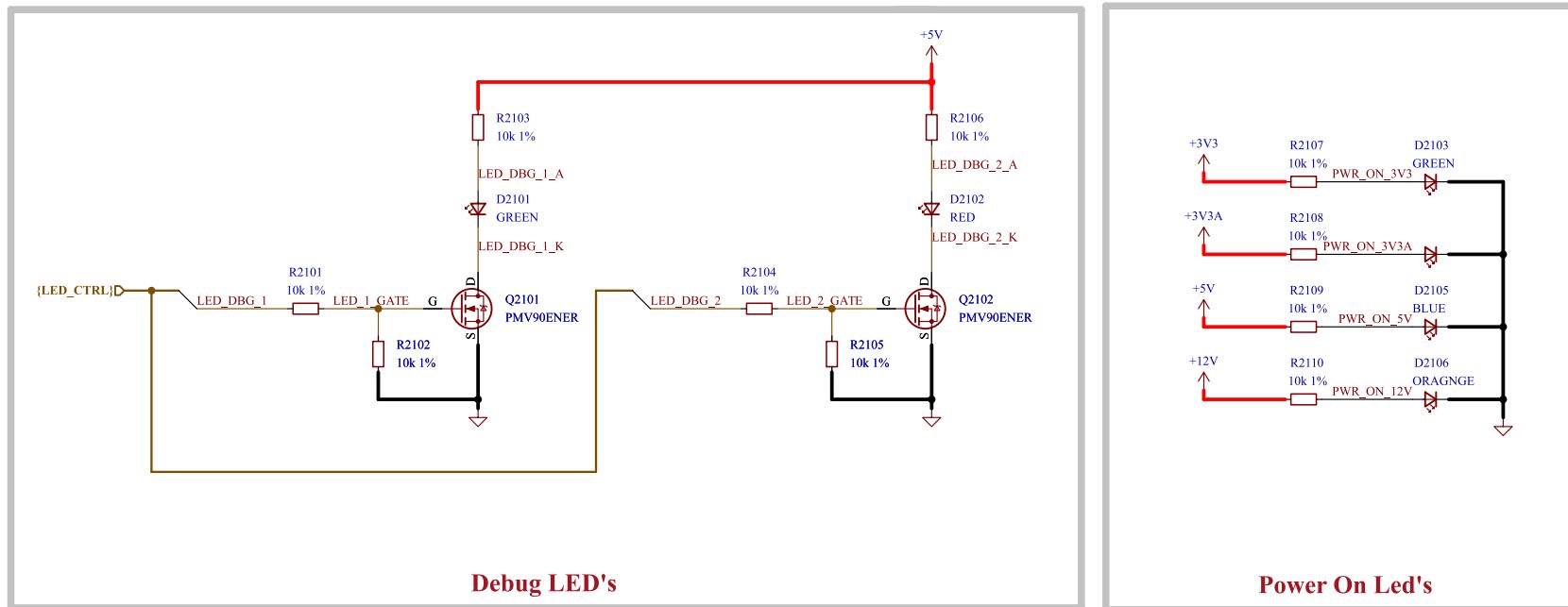


Comments:	Company: EmbedCore		Variant: CHECKED
Board Name: BLDC motor controller	Project Name: BLDC motor controller		
Sheet Title: Interface - Fan Control	File Name: Interface - Fan Control.kicad_sch	Designer: Nagy Richárd	Date: Last Modified Date Revision: 2.0
Sheet Path: /Project Architecture/Interface - Fan Control/	Reviewer: Nagy Richárd	Size: A4	Sheet: 19 of 25

[20] Interface - Interconnects



[21] User - LED Indicators



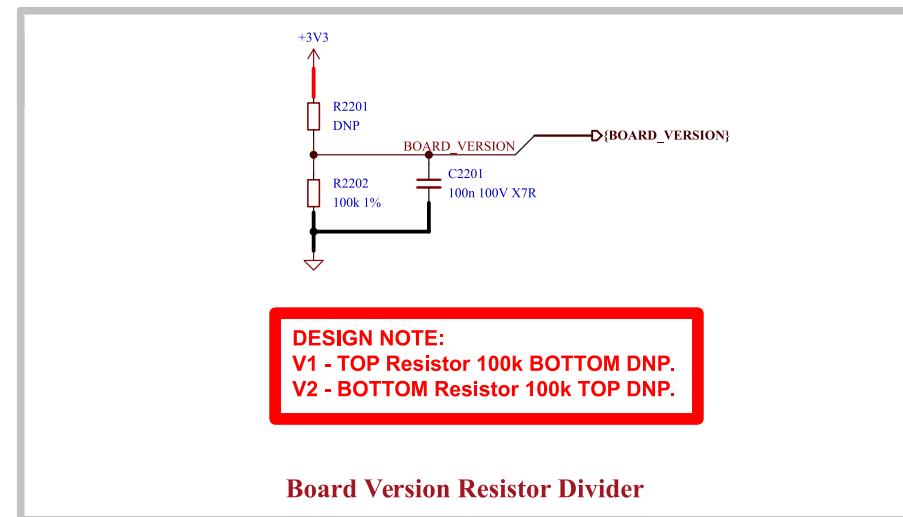
Debug LED's

Power On Led's



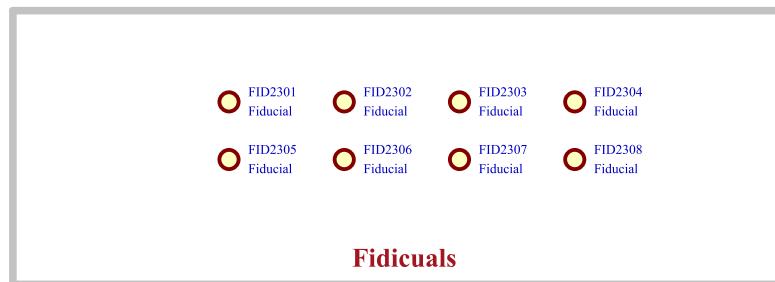
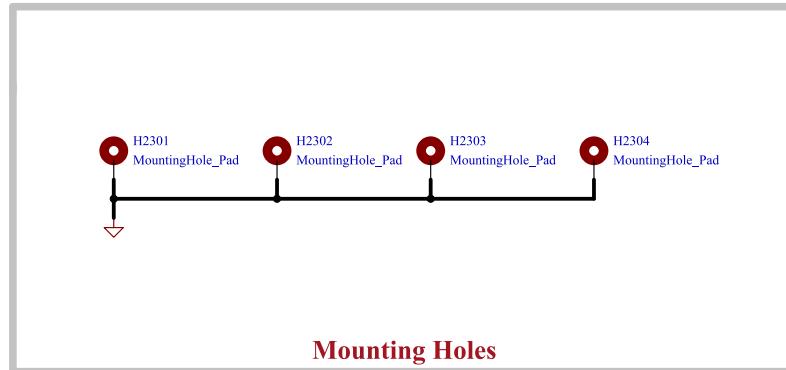
Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Sheet Title B	User - LED Indicators.kicad_sch	Nagy Richárd	Last Modified Date	User - LED Indicators
Sheet Path:	Reviewer:	Size:	Sheet:	
/Project Architecture/User - LED Indicators/	Nagy Richárd	A4	21	of 25

[22] Misc - Board Version, DAC



Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name:	BLDC motor controller
Sheet Title:	File Name:	Designer:	Date:	Revision:
Misc - Board Version, DAC	Misc - Board Version, DAC.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Project Architecture/Misc - Board Version, DAC/	Nagy Richárd		A4	22 of 25

[23] Misc - Hoes, Fiducials



Comments:	Company: EmbedCore		Variant: CHECKED	
Board Name:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Misc - Hoes, Fiducials	Misc - Holes, Fiducials.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path: /Misc - Holes, Fiducials/		Reviewer:	Size:	Sheet: A4 23 of 25

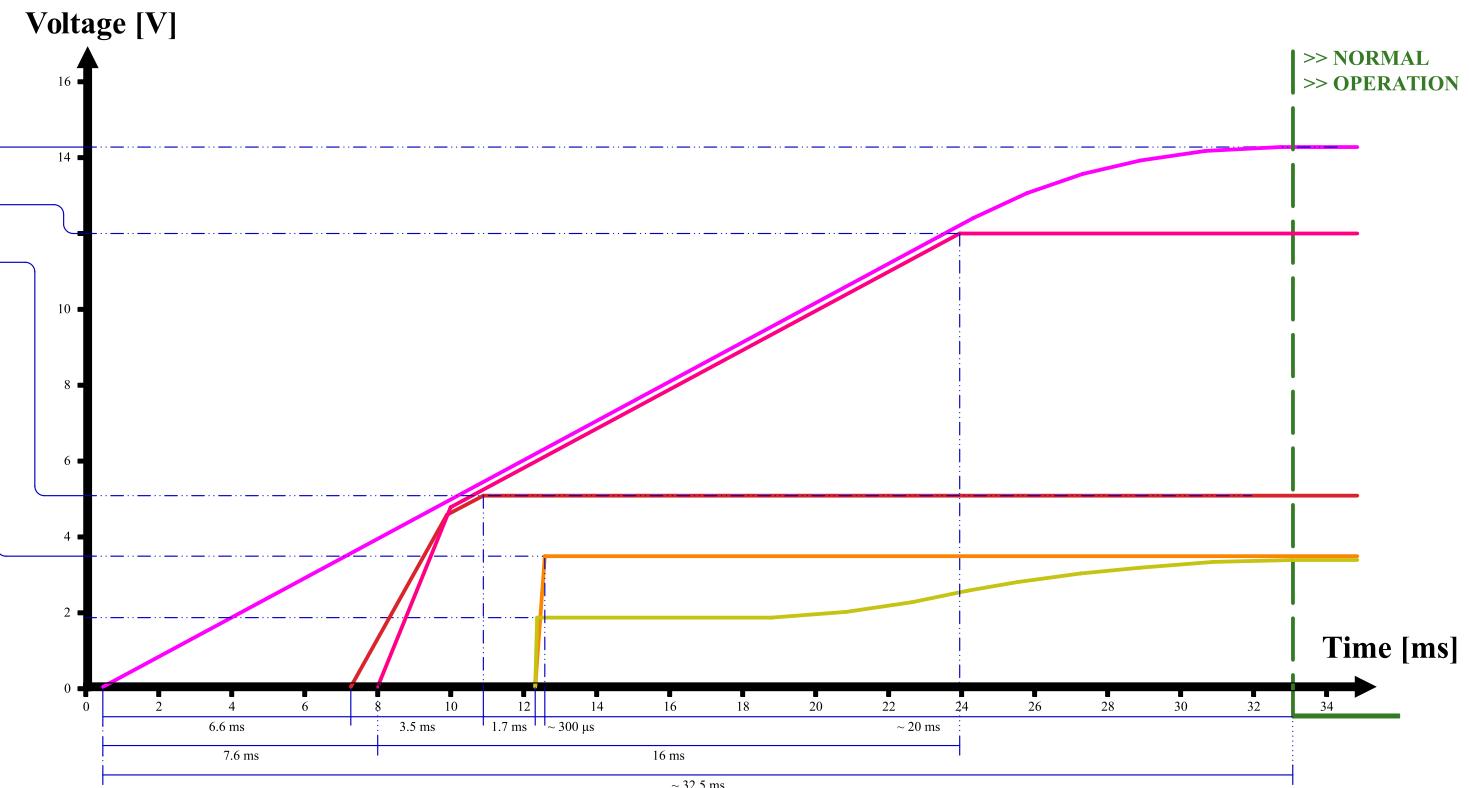
[24] Power - Sequencing

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:	BLDC motor controller		Project Name: BLDC motor controller	
Sheet Title:	File Name:	Designer:	Date:	Revision:
Power - Sequencing	Power - Sequencing.kicad_sch	Nagy Richárd	Last Modified Date	2.0
Sheet Path:	Reviewer:		Size:	Sheet:
/Power - Sequencing/	Nagy Richárd		A4	24 of 25

[25] Revision History

A	DD.MM.YYYY - xxx Revision Variant: xxx	A			
B	-	-	-	-	B
C	-	-	-	-	C



Comments:	Company: EmbedCore	Variant: CHECKED
	Board Name: BLDC motor controller	
Sheet Title: Revision History	File Name: Revision History.kicad_sch	Designer: Nagy Richárd
Sheet Path: /Revision History/		Reviewer: Nagy Richárd
		Size: A4
		Sheet: 25 of 25