SDRR

LIDO

Variant: Development

Sample Type: B-Sample

07/04/2022

Version and Revision

0 .3

Sch. & PCB Freezed

DESIGN CONSIDERATIONS

DESIGN NOTE:
Example text for informational design notes .

DESIGN NOTE:
Example text for cautionary design notes.

DESIGN NOTE:
Example text for debug notes.

DESIGN NOTE:
Example text for critical design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.

TOP VIEW

BOTTOM VIEW

Title: *		Dott (emTransit B.V.)
Date: 20/05/2022 Engineer: FG	Part Number: *xxxxx	Westerdok
	Revision: .3	Van Diemenstraat 292
Size: A3 Sheet 1 of 17 Version: 0	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO	File: LIDO-HW.001.CoverPage.SchDoc	The Netherlands

ID002 - Revision History

Index	Date	HISTORY
1	29/04/2022	Draft schematic wiht symbo only ready for first reviews within team and Vladimir (external)
2	04/05/2022	V0.1 - Corrections based on the first sch. review meeting.
3	17/05/2022	V0.2 - Vladimir's comments/suggestions added to schematic. Old symbol where replaced by real components (Symbol + Footprint) from the databsae library with the part numbers provided by Vladimir. Some of the part numbers change due to no stock. main parameter remains.
4	01/06/2022	V0.3 - Connectors and Capacitors changed due to space constrains. - New connectors have smaller pitch. Main connector with 1.50mm pitch; Ratings: 100Volts and up to 2.0Amp. Sensor's conenctor with 1.25mm pitch; Ratings: 50Volts and up to 1.0Amp. - Some Polymer Caps change to MLCC caps due to space constrains. - Component placement completed in this revision.

Title: *		Dott (emTransit B.V.)
Date: 20/05/2022 Engineer: FG	Part Number: *xxxxx Revision: .3	Westerdok Van Diemenstraat 292 1013 CR, Amsterdam The Netherlands
Size: A3 | Sheet 2 of 17 | Version: 0	Rev. date: *Param	
Project: LIDO	File: LIDO-HW.002.RevisionHistory.SchDoc	

ID003 - Block Diagram

POWER SUPPLIES

U_LIDO-HW.100.VinAndPower
LIDO-HW.100.VinAndPower.SchDoc

+VIN

+12V0
+5V0
+3V3

SNS_OC.EN
SNS_OC.FLT

CONNECTORS

U_LIDO-HW.100.FrontConnector
LIDO-HW.100.FrontConnector.SchDoc

THROTTLE_1_SIG_CONN
THROTTLE_2_SIG_CONN
RIGHT_BRAKE_SIG_CONN
LEFT_BRAKE_SIG_CONN
IND_SWITCH_RIGHT_CONN
IND_SWITCH_LEFT_CONN
IND_SWITCH_CANCEL_CONN
SPARE_GPIO1_CONN
IND_LIGHT_RIGHT_PWR
IND_LIGHT_LEFT_PWR
SPARE_OUT1_PWR

U_LIDO-HW.100.RearConnector
LIDO-HW.100.RearConnector.SchDoc

+VIN
VEH_CAN_P
VEH_CAN_N
DISPLAY_UART.TXD_B
DISPLAY_UART.RXD_B
DISPLAY_UART.RTS_B
DISPLAY_UART.CTS_B
SL_I2C.SDA_B_F
SL_I2C.SCL_B_F
ACC_CAN_P
ACC_CAN_N
ACC_UART.TXD_B
ACC_UART.RXD_B
ACC_UART.RTS_B
ACC_UART.CTS_B
SPARE_GPIO2_CONN
SPARE_OUT2_PWR
DISPLAY_PWR
STATUS_LIGHT_PWR
ACCESSORY_PWR
FRONT_LIGHT_PWR

INTERFACES

U_LIDO-HW.100.InputStage_1
LIDO-HW.100.InputStage_1.SchDoc

THROTTLE_1_SIG_CONN
THROTTLE_2_SIG_CONN
RIGHT_BRAKE_SIG_CONN
LEFT_BRAKE_SIG_CONN
THROTTLE_1_SIG
THROTTLE_2_SIG
RIGHT_BRAKE_SIG
LEFT_BRAKE_SIG

U_LIDO-HW.100.InputStage_2
LIDO-HW.100.InputStage_2.SchDoc

IND_SWITCH_RIGHT_CONN
IND_SWITCH_LEFT_CONN
IND_SWITCH_CANCEL_CONN
SPARE_GPIO1_CONN
SPARE_GPIO2_CONN
IND_SWITCH_RIGHT_F
IND_SWITCH_LEFT_F
IND_SWITCH_CANCEL_F
SPARE_GPIO1_F
SPARE_GPIO2_F

U_LIDO-HW.300.VehicleInterface
LIDO-HW.300.VehicleInterface.SchDoc

VEH_CAN_P
VEH_CAN_N
VEH_CAN.TXD
VEH_CAN.RXD
VEH_CAN.STBY
VEH_CAN.TERM

U_LIDO-HW.300.DisplayInterface
LIDO-HW.300.DisplayInterface.SchDoc

DISPLAY_UART.TXD_B
DISPLAY_UART.RXD_B
DISPLAY_UART.RTS_B
DISPLAY_UART.CTS_B
DISPLAY_UART.TXD
DISPLAY_UART.RXD
DISPLAY_UART.RTS
DISPLAY_UART.CTS

U_LIDO-HW.300.StatusLightInterface
LIDO-HW.300.StatusLightInterface.SchDoc

SL_I2C.SDA_B_F
SL_I2C.SCL_B_F
SL_I2C.SDA
SL_I2C.SCL

U_LIDO-HW.400.AccessoryInterfaces
LIDO-HW.400.AccessoryInterfaces.SchDoc

ACC_CAN_P
ACC_CAN_N
ACC_UART.TXD_B
ACC_UART.RXD_B
ACC_UART.RTS_B
ACC_UART.CTS_B
ACC_CAN.TXD
ACC_CAN.RXD
ACC_CAN.STBY
ACC_CAN.TERM
ACC_UART.TXD
ACC_UART.RXD
ACC_UART.RTS
ACC_UART.CTS

U_LIDO-HW.100.OutputStage
LIDO-HW.100.OutputStage.SchDoc

IND_LIGHT_RIGHT_PWR
IND_LIGHT_LEFT_PWR
SPARE_OUT1_PWR
SPARE_OUT2_PWR
DISPLAY_PWR
STATUS_LIGHT_PWR
ACCESSORY_PWR
FRONT_LIGHT_PWR
DVR.RESET
DRV_SPI0.SCK
DRV_SPI0.MOSI
DRV_SPI0.MISO
DRV_SPI0.CS

MCU

U_LIDO-HW.200.MCU_Peripherals_1
LIDO-HW.200.MCU_Peripherals_1.SchDoc

THROTTLE_1_SIG
THROTTLE_2_SIG
I2C0.SDA
I2C0.SCL
TMP_PWRLERT
IND_SWITCH_RIGHT_F
IND_SWITCH_LEFT_F
IND_SWITCH_CANCEL_F
SPARE_GPIO1_F
SPARE_GPIO2_F
VEH_CAN.TXD
VEH_CAN.RXD
VEH_CAN.STBY
VEH_CAN.TERM
DISPLAY_UART.TXD
DISPLAY_UART.RXD
SL_I2C.SDA
SL_I2C.SCL
ACC_CAN.TXD
ACC_CAN.RXD
ACC_CAN.STBY
DVR.RESET

U_LIDO-HW.200.MCU_Peripherals_2
LIDO-HW.200.MCU_Peripherals_2.SchDoc

RIGHT_BRAKE_SIG
LEFT_BRAKE_SIG
SNS_OC.EN
SNS_OC.FLT
ACC_CAN.TERM
ACC_UART.TXD
ACC_UART.RXD
ACC_UART.RTS
ACC_UART.CTS
DISPLAY_UART.RTS
DISPLAY_UART.CTS
DRV_SPI0.SCK
DRV_SPI0.MOSI
DRV_SPI0.MISO
DRV_SPI0.CS

U_LIDO-HW.200.MCU_SWD_Reset
LIDO-HW.200.MCU_SWD_Reset.SchDoc

SECURITY & BRD TEMP.

U_LIDO-HW.200.SecurityAndTemperature
LIDO-HW.200.SecurityAndTemperature.SchDoc

I2C0.SDA
I2C0.SCL
TMP_PWRLERT

QR1

Code:
QR CODE

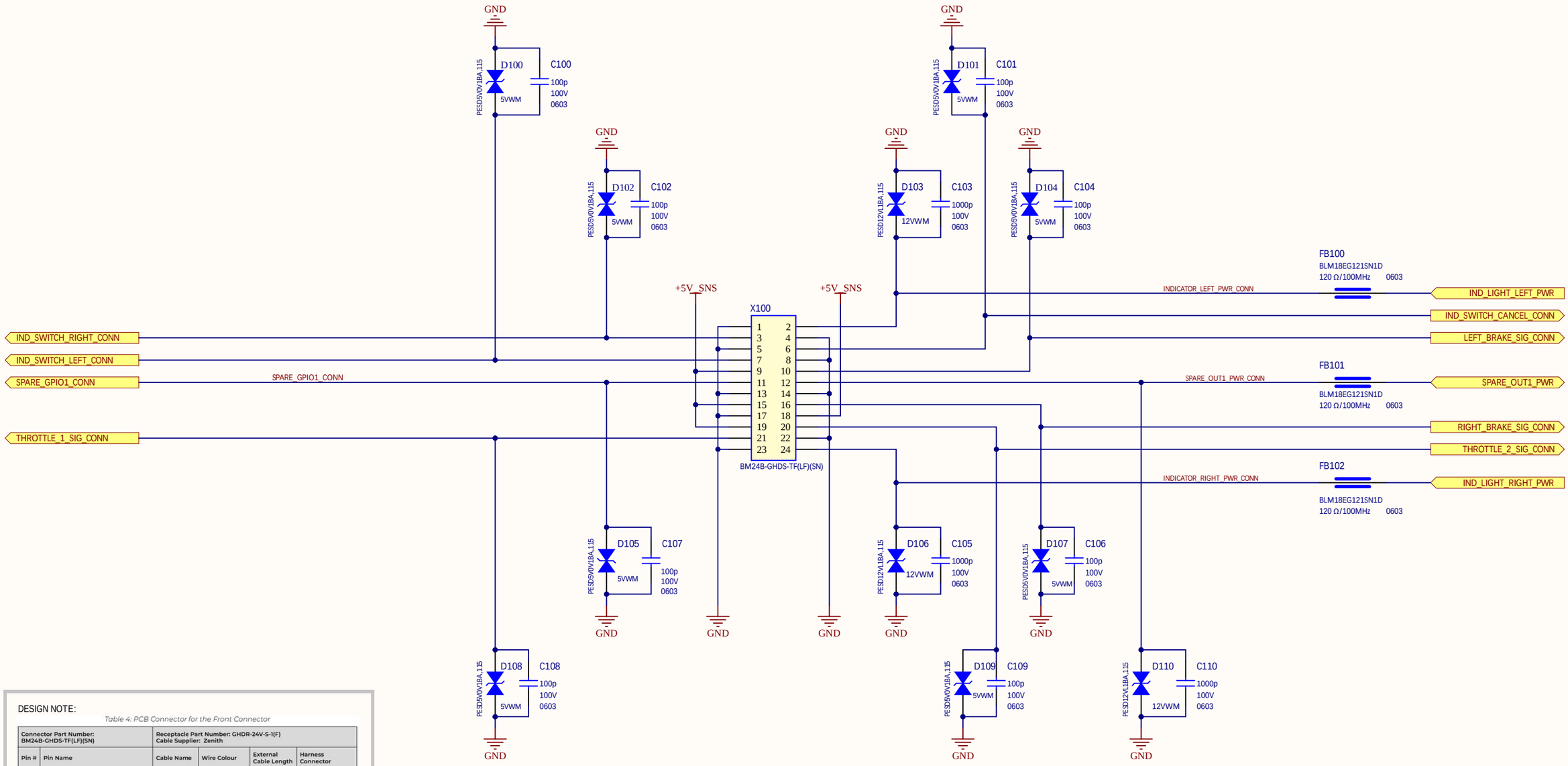
Size: 8 x 8 mm
QR

QR_Code_B

Title: *			
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	
Size: A3	Sheet 3 of 17	Version: 0	Revision: .3 Rev. date: *Param
Project: LIDO		File: LIDO-HW.003.BlockDiagram.SchDoc	

Dott (emTransit B.V.)
Westerdok
Van Diemenstraat 292
1013 CR, Amsterdam
The Netherlands

ID100 - FRONT CONNECTOR



DESIGN NOTE:

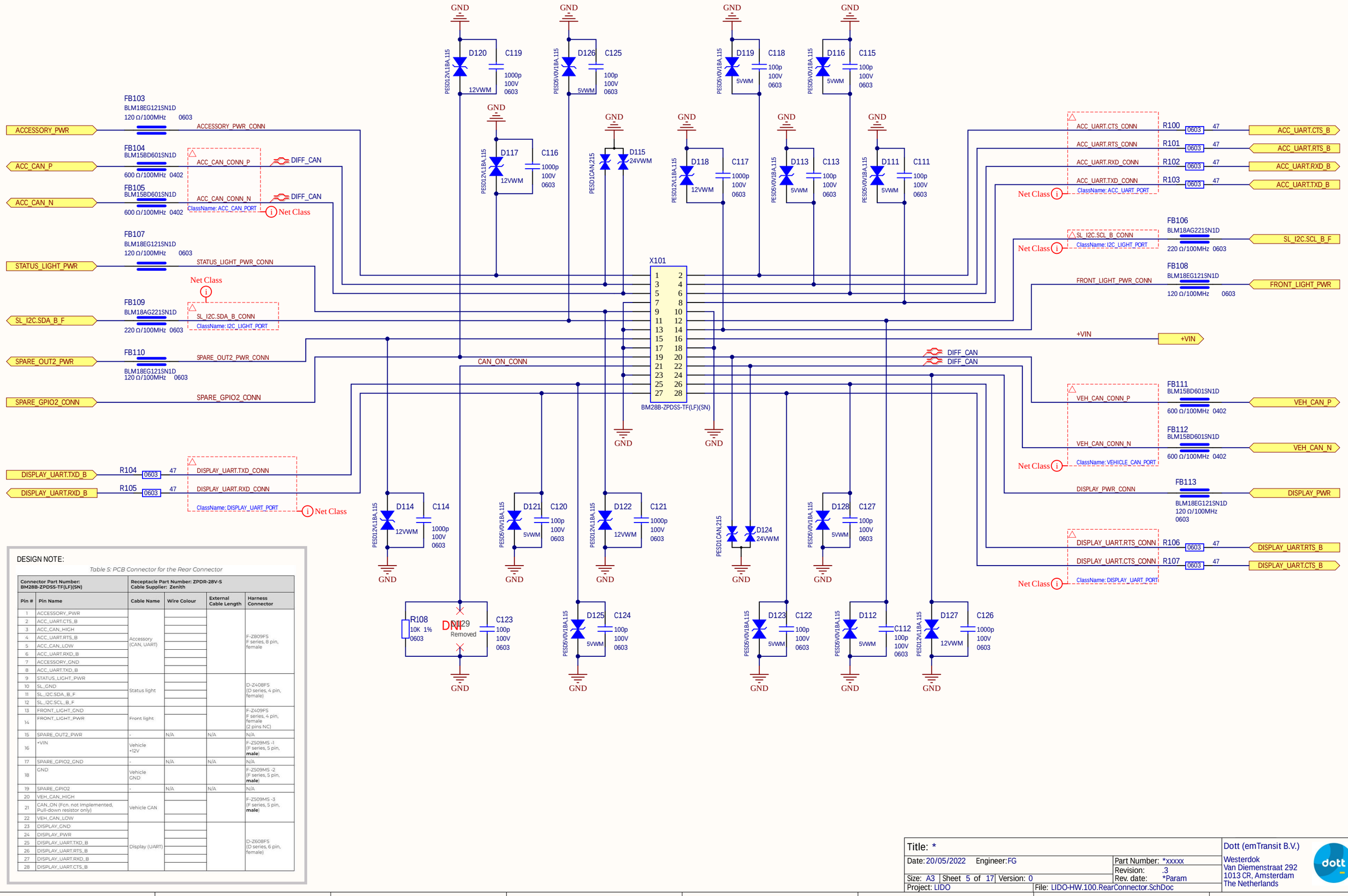
Table 4: PCB Connector for the Front Connector

Connector Part Number: BM24B-GHDS-TF(LF)(SN)		Receptacle Part Number: GHDR-24V-S-1(F) Cable Supplier: Zenith			
Pin #	**Pin Name**	**Cable Name**	**Wire Colour**	**External Cable Length**	**Harness Connector**
1	IND_LIGHT_LEFT_GND	Left indicator			D-Z208FS (D series, 2 pin, female)
2	IND_LIGHT_LEFT_PWR				
3	IND_SWITCH_RIGHT_CONN	Control switch			D-Z508FS (D series, 5 pin, female)
4	NC				
5	IND_SWITCH_GND				
6	IND_SWITCH_CANCEL_CONN				
7	IND_SWITCH_LEFT_CONN				
8	LEFT_BRAKE_SIG_GND	Left brake			D-Z308FS (D series, 3 pin, female)
9	+5V_SNS				
10	LEFT_BRAKE_SIG				
11	SPARE_GPIO1	-	N/A	N/A	N/A
12	SPARE_OUT1_PWR				
13	SPARE_GPIO1_GND				
14	RIGHT_BRAKE_GND	Right brake			F-Z309FS (F series, 3 pin, female)
15	+5V_SNS				
16	RIGHT_BRAKE_SIG				
17	THROTTLE_1_GND	Throttle			F-Z609FS (F series, 6 pin, female)
18	+5V_SNS				
19	+5V_SNS				
20	THROTTLE_2_SIG				
21	THROTTLE_1_SIG				
22	THROTTLE_2_GND				
23	IND_LIGHT_RIGHT_GND	Right indicator			F-Z209FS (F series, 2 pin, female)
24	IND_LIGHT_RIGHT_PWR				

Title: *			
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	
Size: A3	Sheet 4 of 17	Version: 0	Revision: .3
Project: LIDO		File: LIDO-HW.100.FrontConnector.SchDoc	Rev. date: *Param

Dott (emTransit B.V.)
Westerdok
Van Diemenstraat 292
1013 CR, Amsterdam
The Netherlands

ID100 - REAR CONENCTOR



DESIGN NOTE:

Table 5: PCB Connector for the Rear Connector

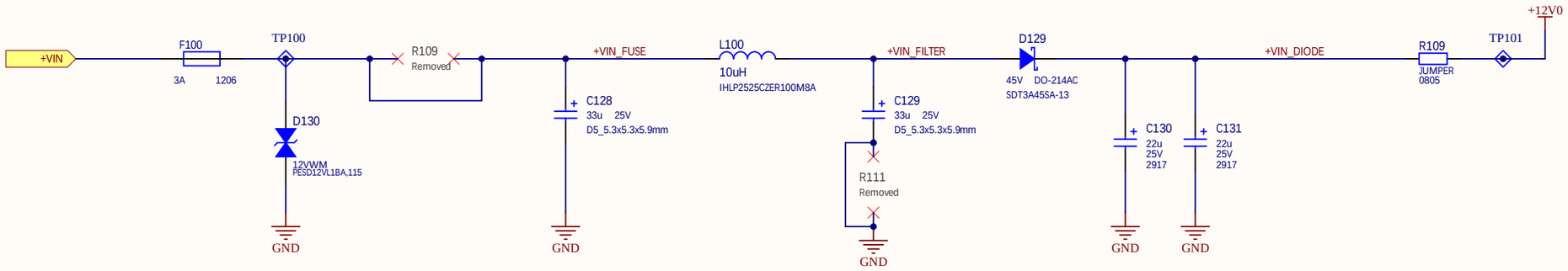
Connector Part Number: BM28B-ZPDSS-TF(LF)(SN)		Receptacle Part Number: ZPDR-28V-S Cable Supplier: Zenith			
Pin #	**Pin Name**	**Cable Name**	**Wire Colour**	**External Cable Length**	**Harness Connector**
1	ACCESSORY_PWR	Accessory (CAN, UART)			F-ZB09FS F series, 8 pin, female
2	ACC_UART.CTS_B				
3	ACC_CAN_HIGH				
4	ACC_UART.RTS_B				
5	ACC_CAN_LOW				
6	ACC_UART.RXD_B				
7	ACCESSORY_GND				
8	ACC_UART.TXD_B				
9	STATUS_LIGHT_PWR	Status light			D-Z408FS (D series, 4 pin, female)
10	SL_GND				
11	SL_I2C.SDA_B_F				
12	SL_I2C.SCL_B_F				
13	FRONT_LIGHT_GND	Front light			F-Z409FS F series, 4 pin, female (2 pins NC)
14	FRONT_LIGHT_PWR				
15	SPARE_OUT2_PWR	-	N/A	N/A	N/A
16	+VIN	Vehicle +12V			F-Z509MS -1 (F series, 5 pin, **male**)
17	SPARE_GPIO2_GND	-	N/A	N/A	N/A
18	GND	Vehicle GND			F-Z509MS -2 (F series, 5 pin, **male**)
19	SPARE_GPIO2	-	N/A	N/A	N/A
20	VEH_CAN_HIGH	Vehicle CAN			F-Z509MS -3 (F series, 5 pin, **male**)
21	CAN_ON (Fcn. not implemented, Pull-down resistor only)				
22	VEH_CAN_LOW				
23	DISPLAY_GND	Display (UART)			D-Z608FS (D series, 6 pin, female)
24	DISPLAY_PWR				
25	DISPLAY_UART.TXD_B				
26	DISPLAY_UART.RTS_B				
27	DISPLAY_UART.RXD_B				
28	DISPLAY_UART.CTS_B				

Title: *			
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	
		Revision: .3	
Size: A3	Sheet 5 of 17	Version: 0	Rev. date: *Param
Project: LIDO		File: LIDO-HW.100.RearConnector.SchDoc	

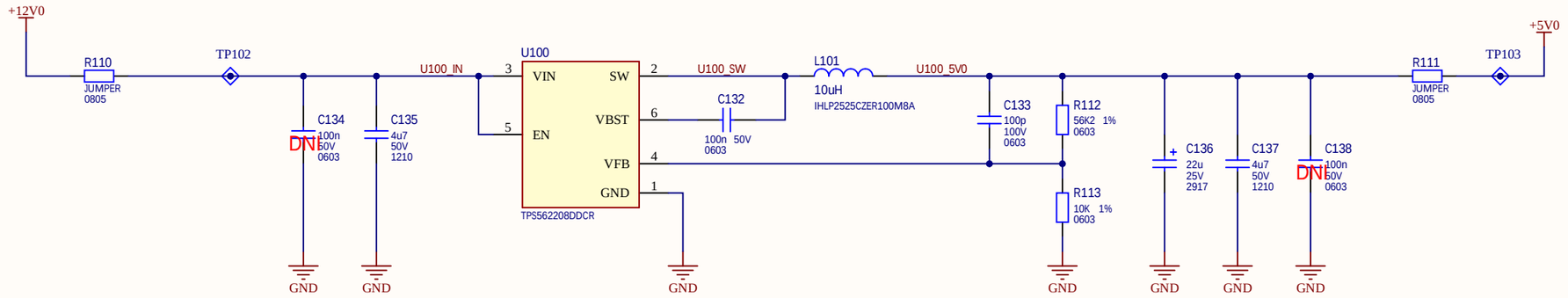
Dott (emTransit B.V.)
Westerdok
Van Diemenstraat 292
1013 CR, Amsterdam
The Netherlands

ID100 - INPUT VOLTAGE AND POWER SUPPLIES

INPUT VOLTAGE AND FILTER

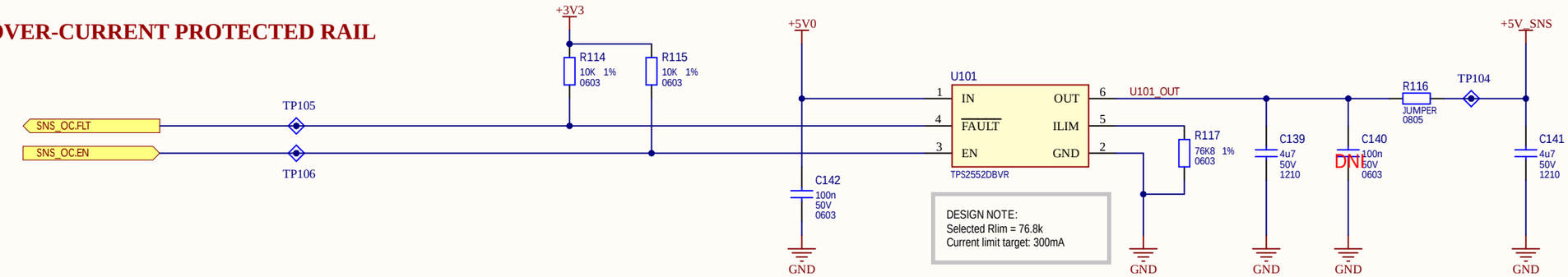


+5V POWER RAIL



TPS56220x LAYOUT NOTE:
4. Keep the SW trace as physically short and wide as practical to minimize radiated emissions.
5. Do not allow switching current to flow under the device.
6. A separate VOUT path should be connected to the upper feedback resistor.
7. Make a Kelvin connection to the GND pin for the feedback path.
8. Voltage feedback loop should be placed away from the high-voltage switching trace, and preferably has ground shield.

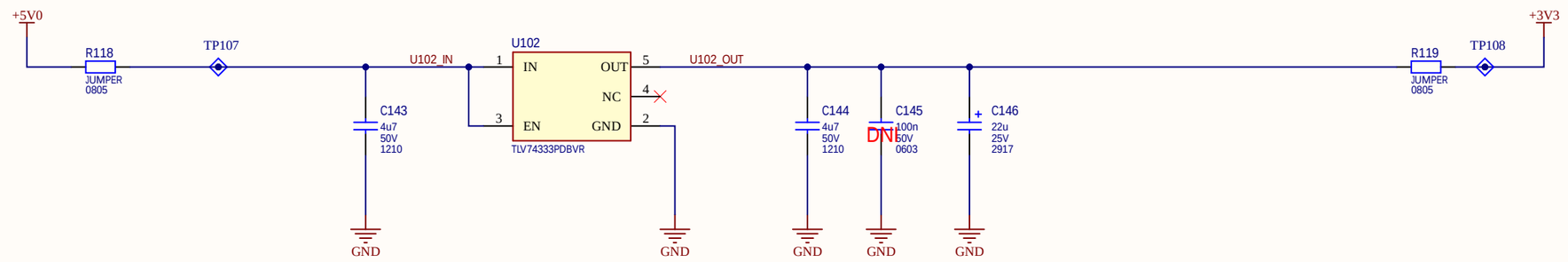
+5V OVER-CURRENT PROTECTED RAIL



TPS2552D DESIGN NOTE:
An output capacitance of 1 µF or larger generally provides good dynamic response.

C141 LAYOUT NOTE:
Place CAP close to Connector

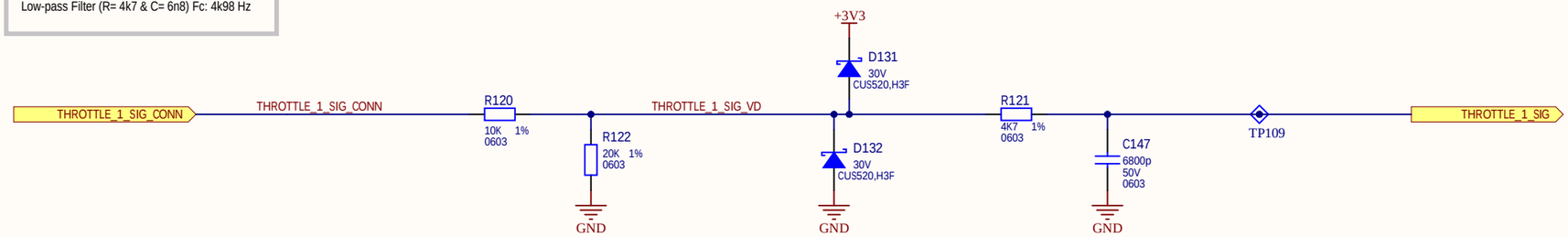
+3V3 POWER RAIL

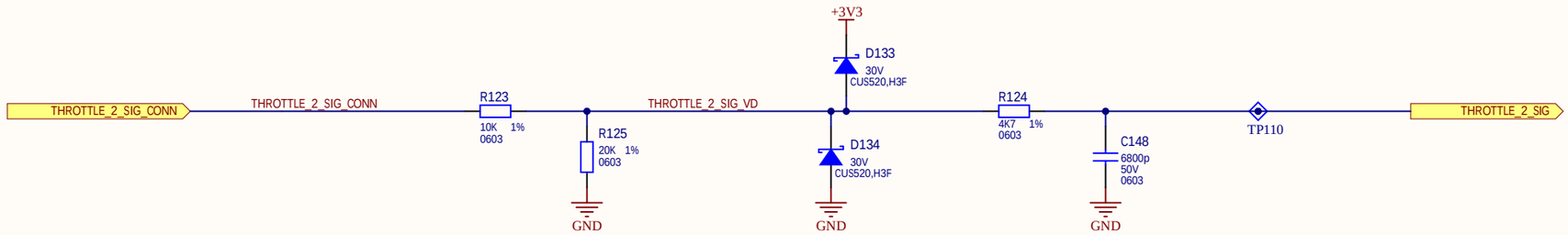


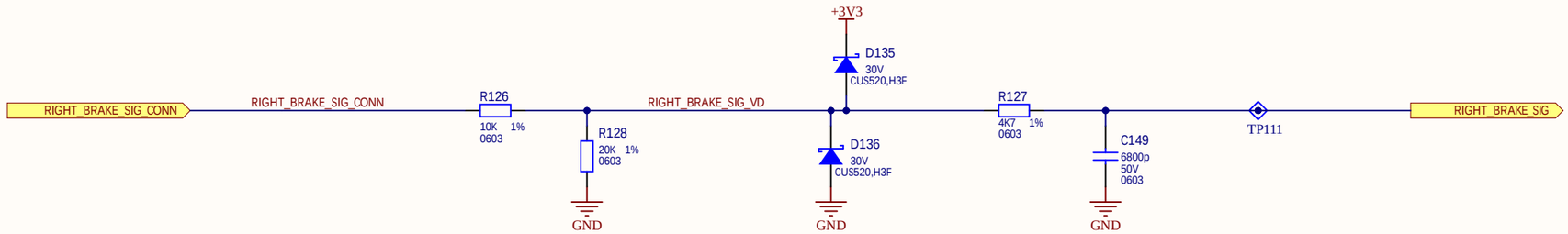
Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok
		Revision: .3	Van Diemenstraat 292
Size: A3	Sheet 6 of 17	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO	File: LIDO-HW.100.VinAndPower.SchDoc		The Netherlands

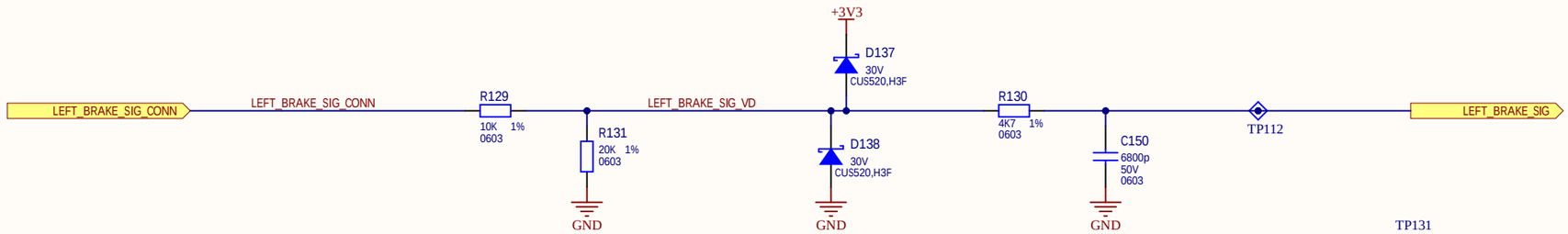
ID100 - INPUT STAGE

DESIGN NOTE:
Low-pass Filter (R= 4k7 & C= 6n8) Fc: 4k98 Hz







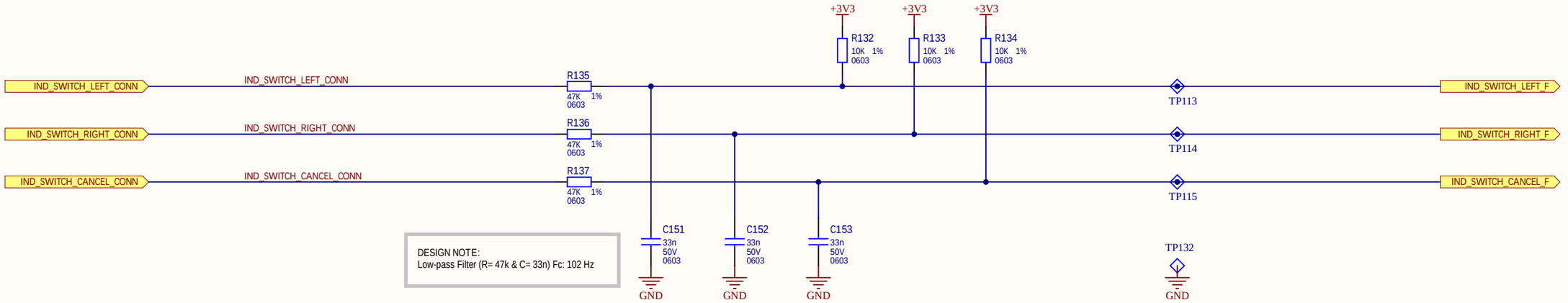


Title: *	
Date: 20/05/2022 Engineer: FG	Part Number: *xxxxx
Size: A3 | Sheet 7 of 17 | Version: 0	Revision: .3
Project: LIDO	Rev. date: *Param
	File: LIDO-HW.100.InputStage_1.SchDoc

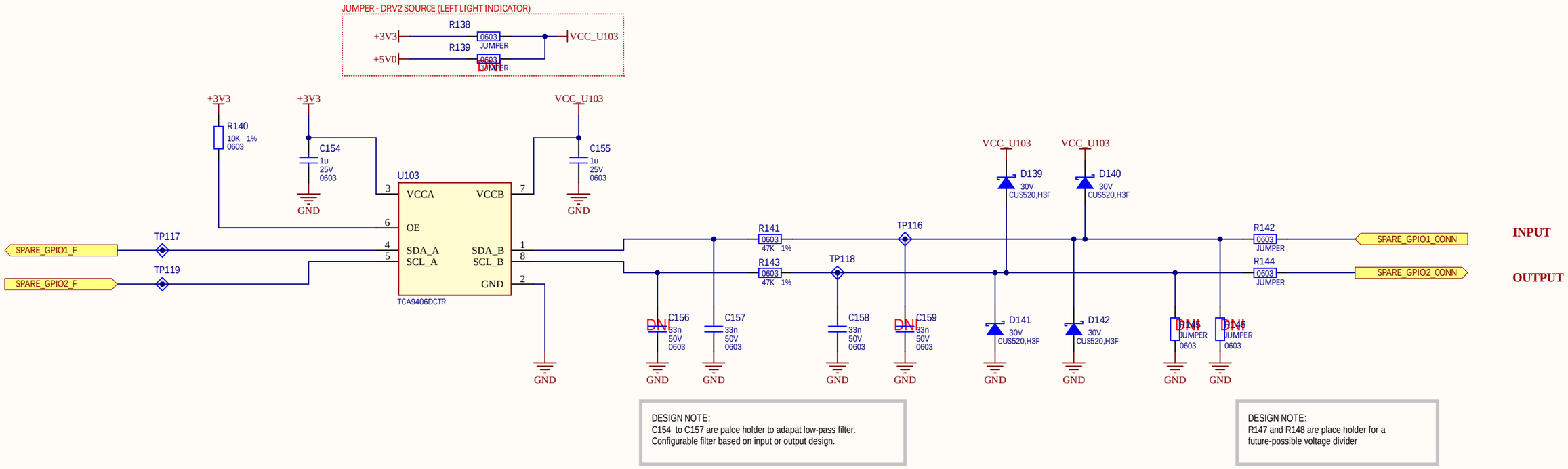
Dott (emTransit B.V.)
Westerdok
Van Diemenstraat 292
1013 CR, Amsterdam
The Netherlands

ID100 - INPUT STAGE

SENSOR SIGNALS



GENERIC GPIO

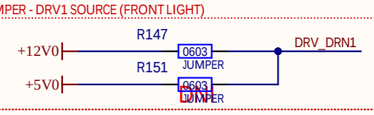


Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok
		Revision: .3	Van Diemenstraat 292
Size: A3	Sheet 8 of 17	Version: 0	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO	File: LIDO-HW.100.InputStage_2.SchDoc		The Netherlands

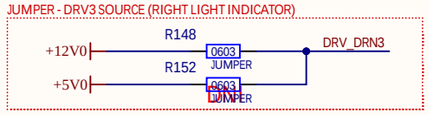
ID100 - OUTPUT STAGE

DRIVER VOLTAGE SELECTOR

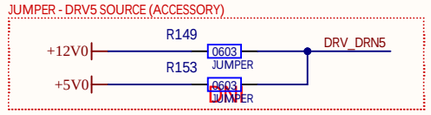
JUMPER - DRV1 SOURCE (FRONT LIGHT)



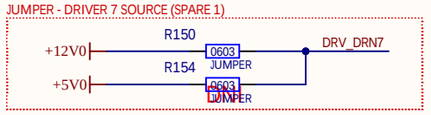
JUMPER - DRV3 SOURCE (RIGHT LIGHT INDICATOR)



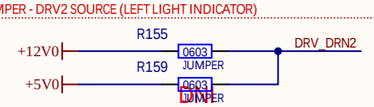
JUMPER - DRV5 SOURCE (ACCESSORY)



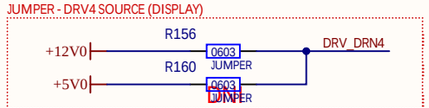
JUMPER - DRIVER 7 SOURCE (SPARE 1)



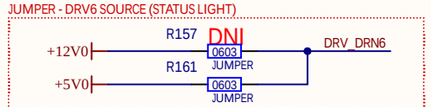
JUMPER - DRV2 SOURCE (LEFT LIGHT INDICATOR)



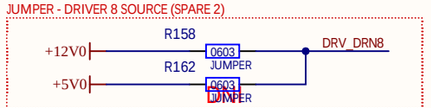
JUMPER - DRV4 SOURCE (DISPLAY)

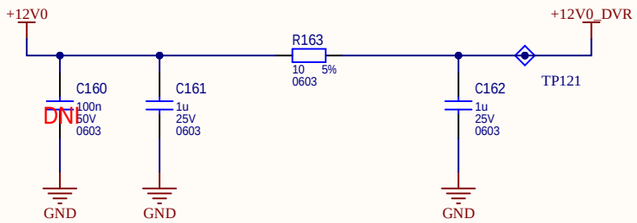


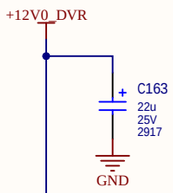
JUMPER - DRV6 SOURCE (STATUS LIGHT)

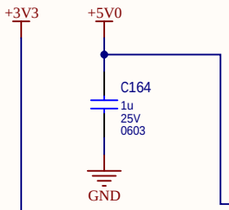


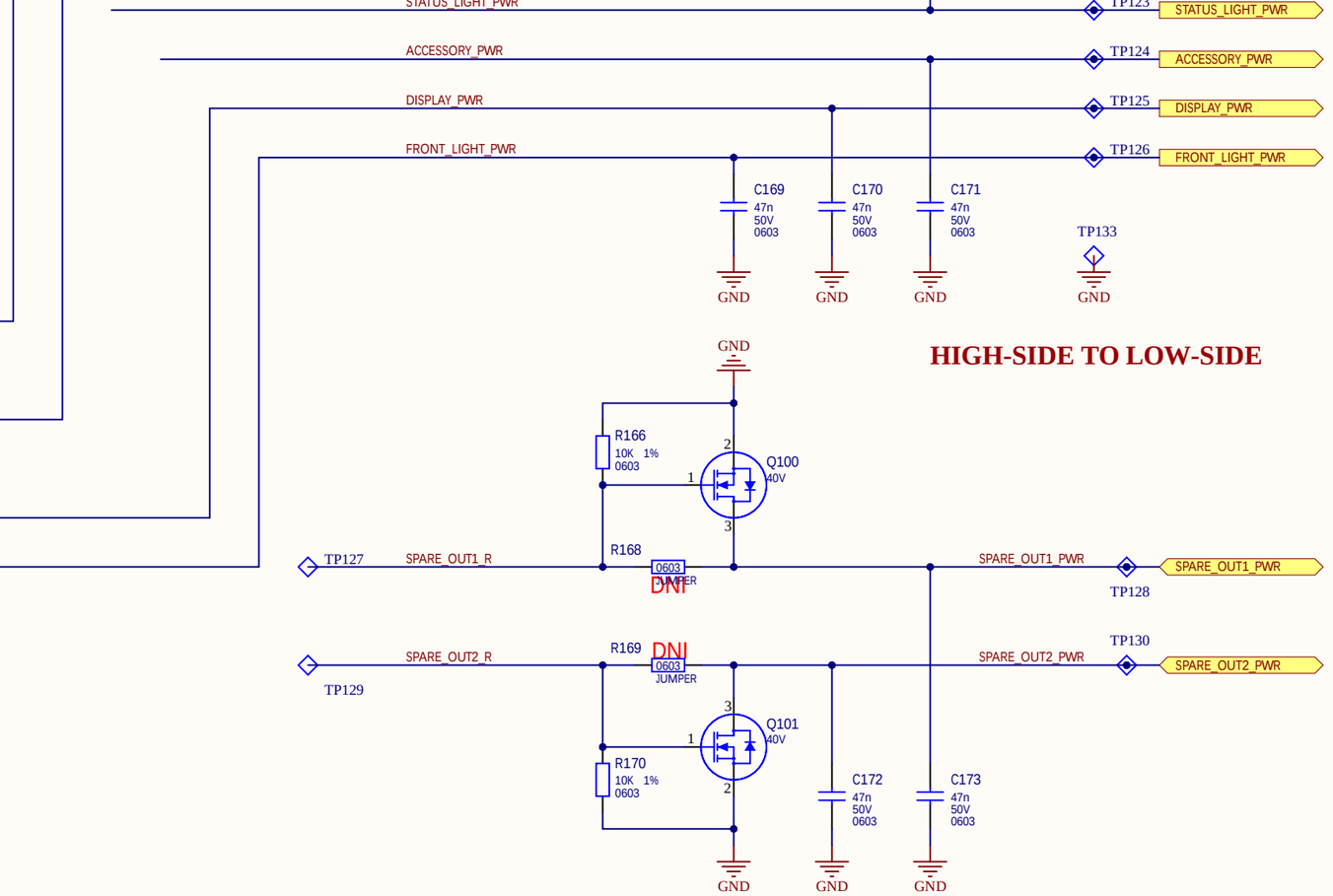
JUMPER - DRIVER 8 SOURCE (SPARE 2)

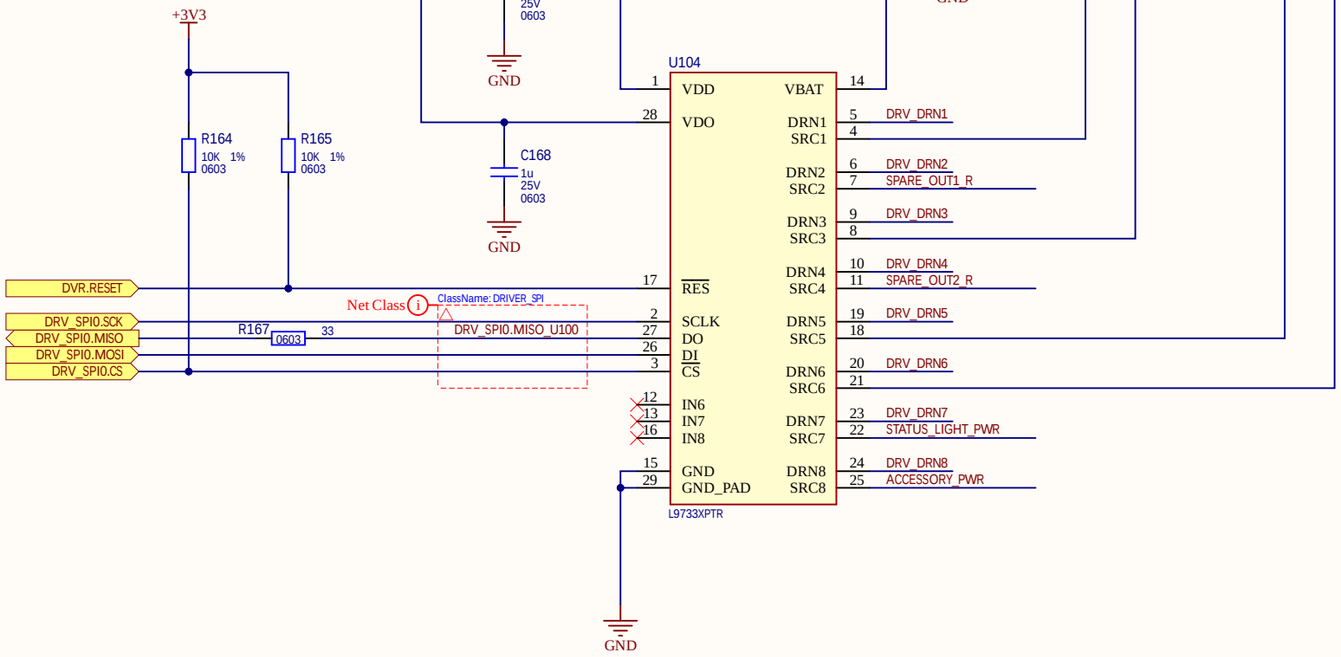








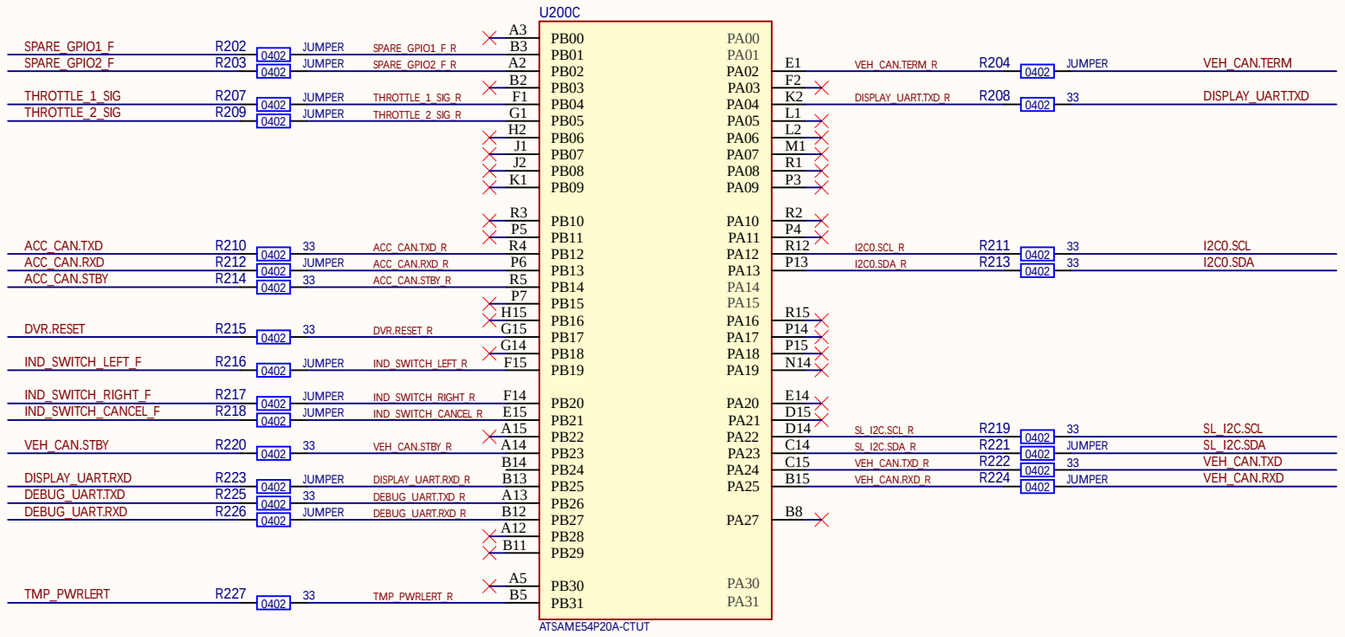




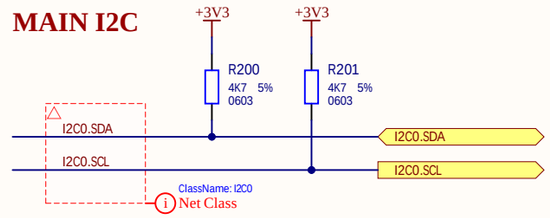
HIGH-SIDE TO LOW-SIDE

Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok
		Revision: .3	Van Diemenstraat 292
Size: A3	Sheet 9 of 17	Version: 0	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO	File: LIDO-HW.100.OutputStage.SchDoc		The Netherlands

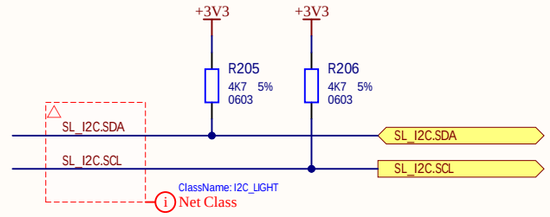
ID200 - MCU PERIPHERALS



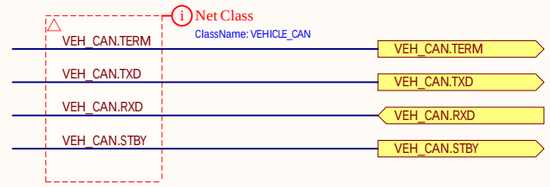
MAIN I2C



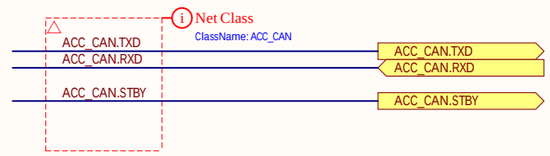
STATUS LIGHT I2C



VEHICLE CAN

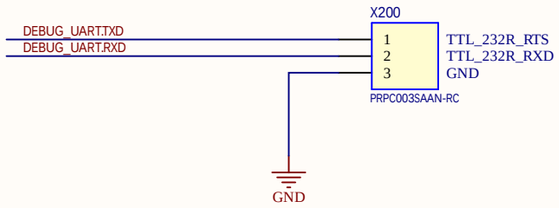


ACCESSORY CAN



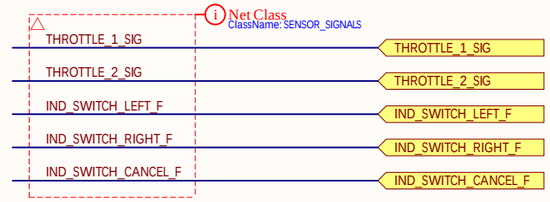
DISPLAY UART

UART DEBUG CONNECTOR

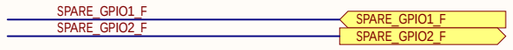


HIGH-SIDE DRIVER

INPUT SENSORS



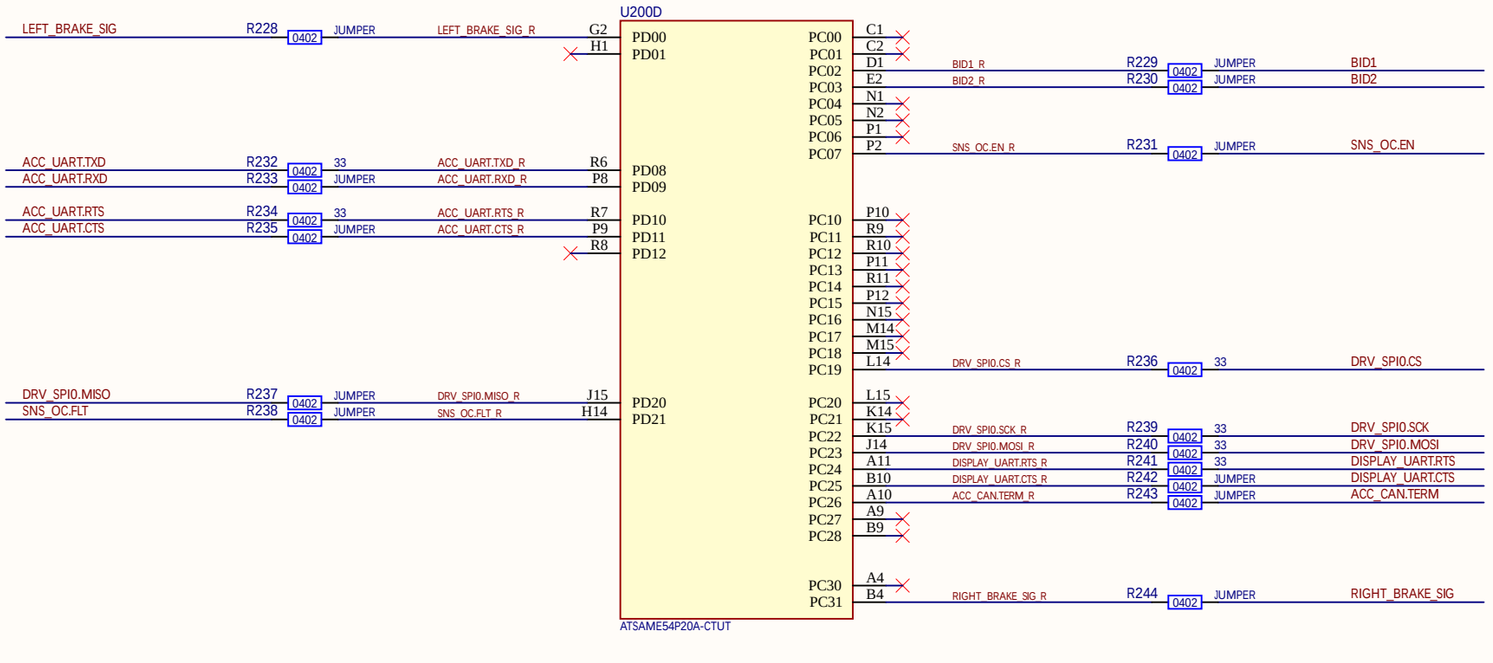
GPIO



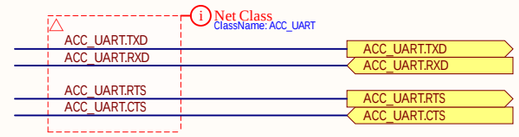
TEMP. SENSOR INTERRUPT

Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok
		Revision: .3	Van Diemenstraat 292
Size: A3	Sheet 10of 17	Version: 0	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO		File: LIDO-HW.200.MCU_Peripherals_1.SchDoc	The Netherlands

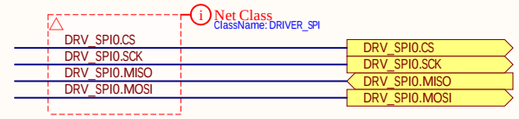
ID200 - MCU PERIPHERALS



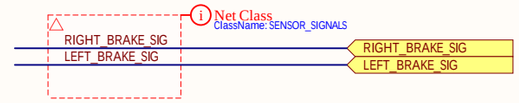
ACCESSORY UART



HIGH-SIDE DRIVER



INPUT SENSORS

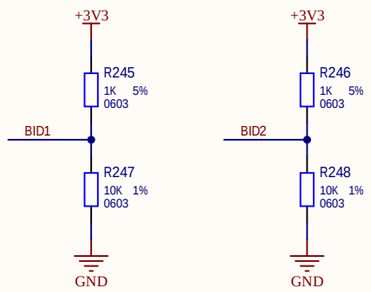


ACCESSORY CAN

DISPLAY UART

OVER-CURRENT SWITCH

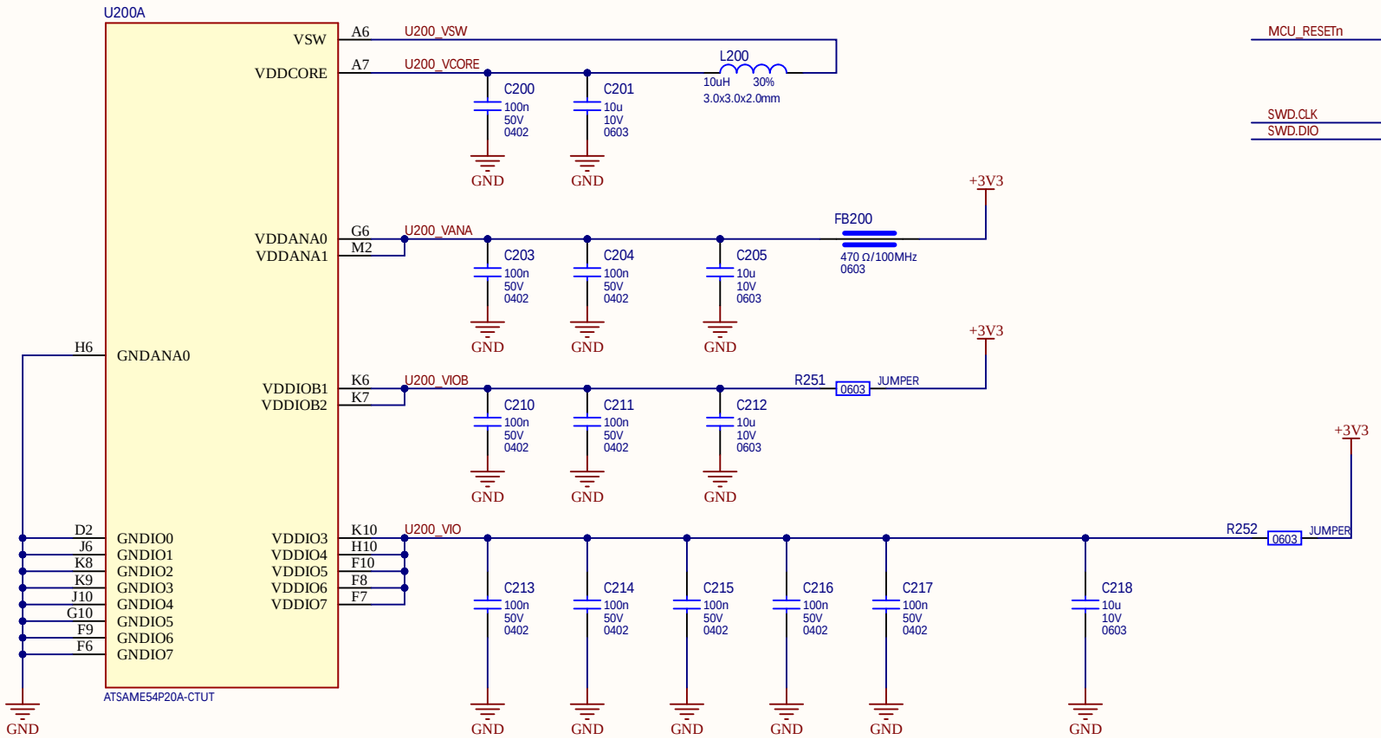
BOARD ID

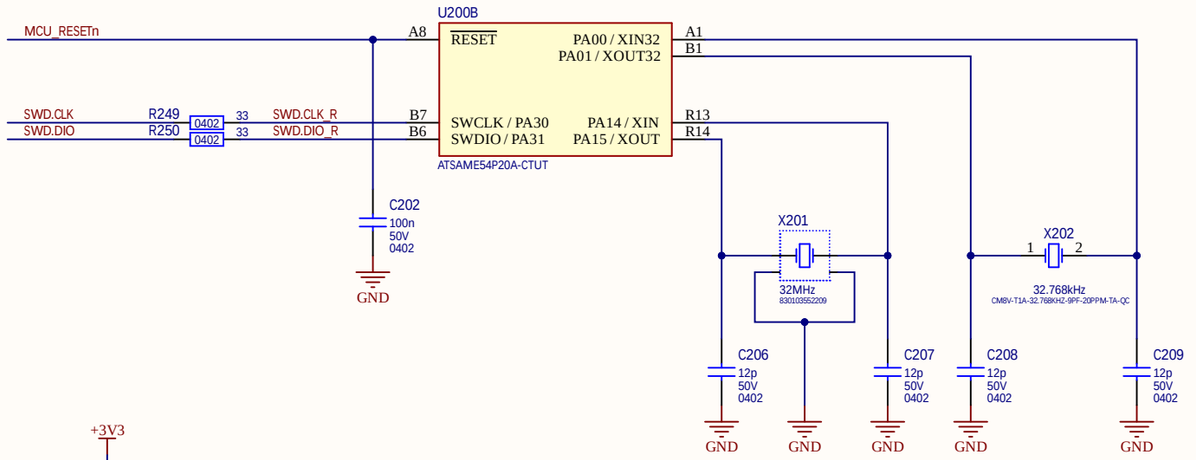


DESIGN NOTE:

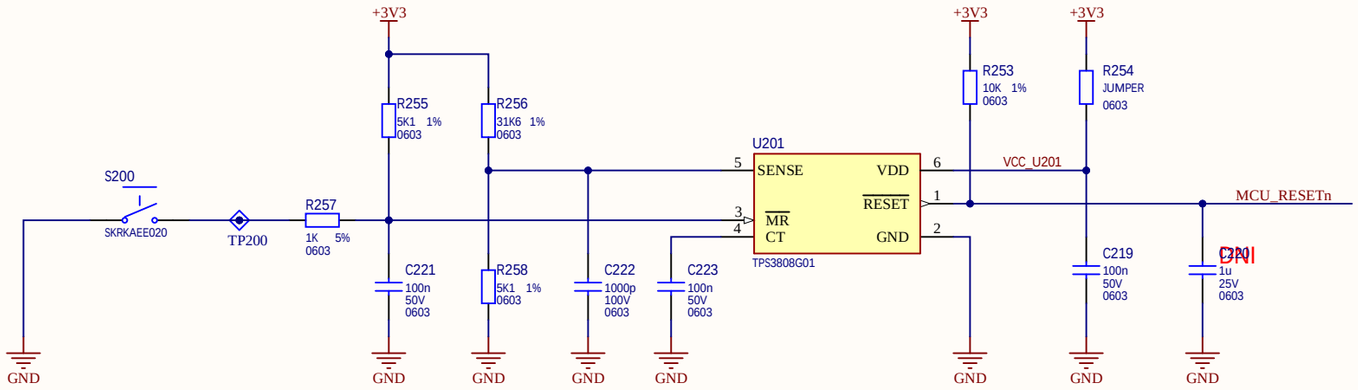
Title: *		Dott (emTransit B.V.)
Date: 20/05/2022 Engineer: FG	Part Number: *xxxxx	Westerdok
	Revision: .3	Van Diemenstraat 292
Size: A3 Sheet 11of 17 Version: 0	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO	File: LIDO-HW.200.MCU_Peripherals_2.SchDoc	The Netherlands

ID200 - MCU POWER, SWD AND RESET

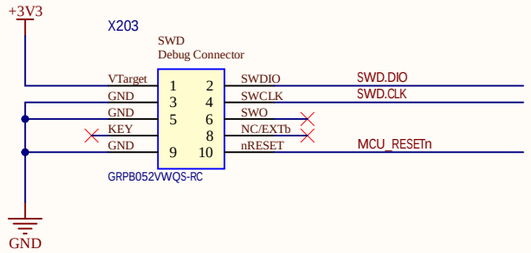




RESET SUPERVISOR



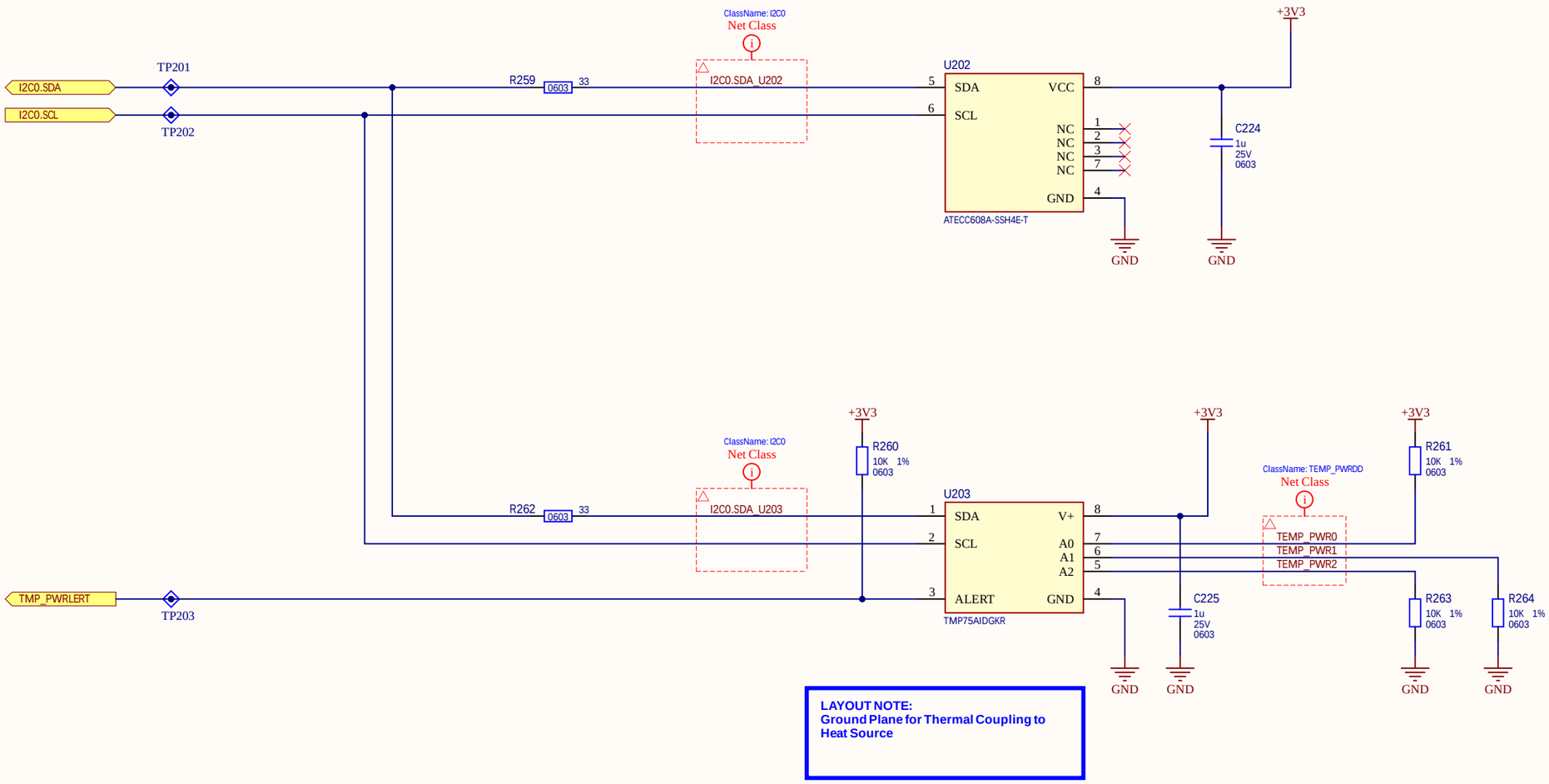
SWD DEBUG CONNECTOR



Title: *	
Date: 20/05/2022 Engineer: FG	Part Number: *xxxxx
Size: A3 Sheet 12of 17 Version: 0	Revision: .3
Project: LIDO	File: LIDO-HW.200.MCU_SWD_Reset.SchDoc
	Rev. date: *Param

Dott (emTransit B.V.)
Westerdok
Van Diemenstraat 292
1013 CR, Amsterdam
The Netherlands

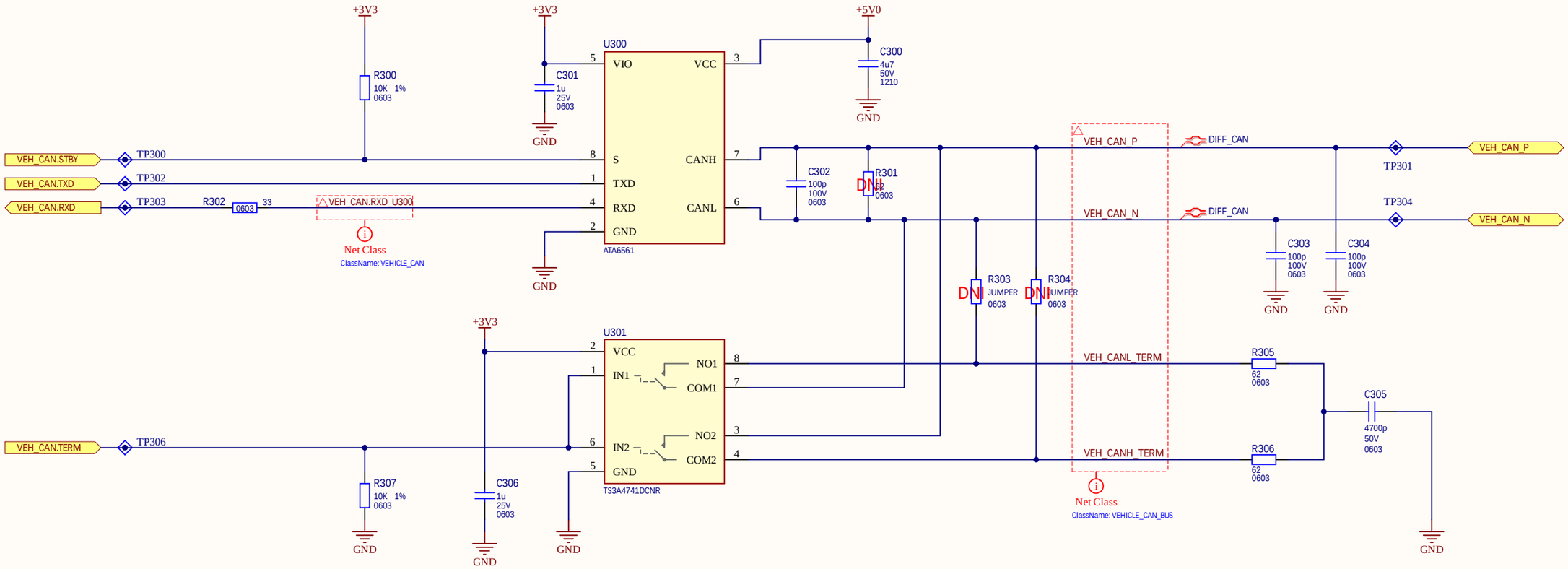
ID200 - SECURITY CHIP AND TEMPERATURE SENSOR



Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok Van Diemenstraat 292 1013 CR, Amsterdam The Netherlands
Size: A3	Sheet 13of 17 Version: 0	Revision: .3 Rev. date: *Param	
Project: LIDO	File: LIDO-HW.200.SecurityAndTemperature.SchDoc		

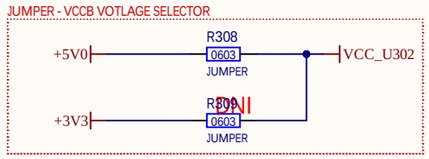
ID300 - VEHICLE INTERFACE

CAN 0 BUS

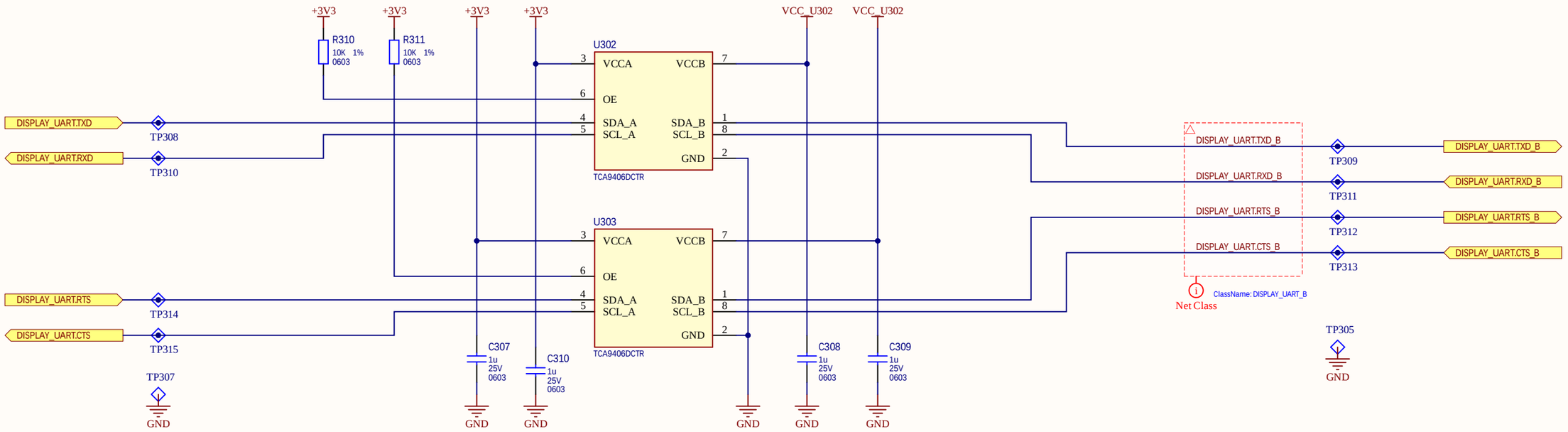


Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok Van Diemenstraat 292 1013 CR, Amsterdam The Netherlands
Size: A3 | Sheet 14of 17 | Version: 0		Revision: .3 Rev. date: *Param	
Project: LIDO	File: LIDO-HW.300.VehicleInterface.SchDoc		

ID300 - DISPLAY INTERFACE



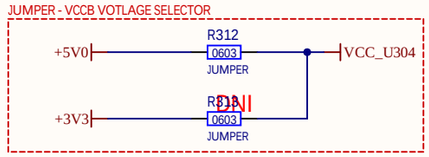
UART1



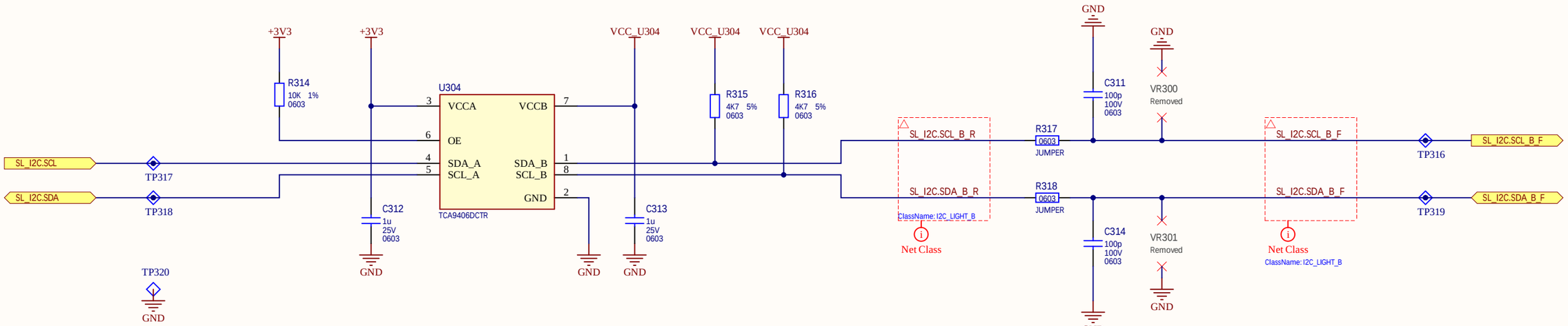
Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok
		Revision: .3	Van Diemenstraat 292
Size: A3	Sheet 15of 17	Version: 0	Rev. date: *Param	1013 CR, Amsterdam
Project: LIDO	File: LIDO-HW.300.DisplayInterface.SchDoc		The Netherlands

ID300 - STATUS LIGHT INTERFACE

JUMPER - VCCB VOTLAGE SELECTOR



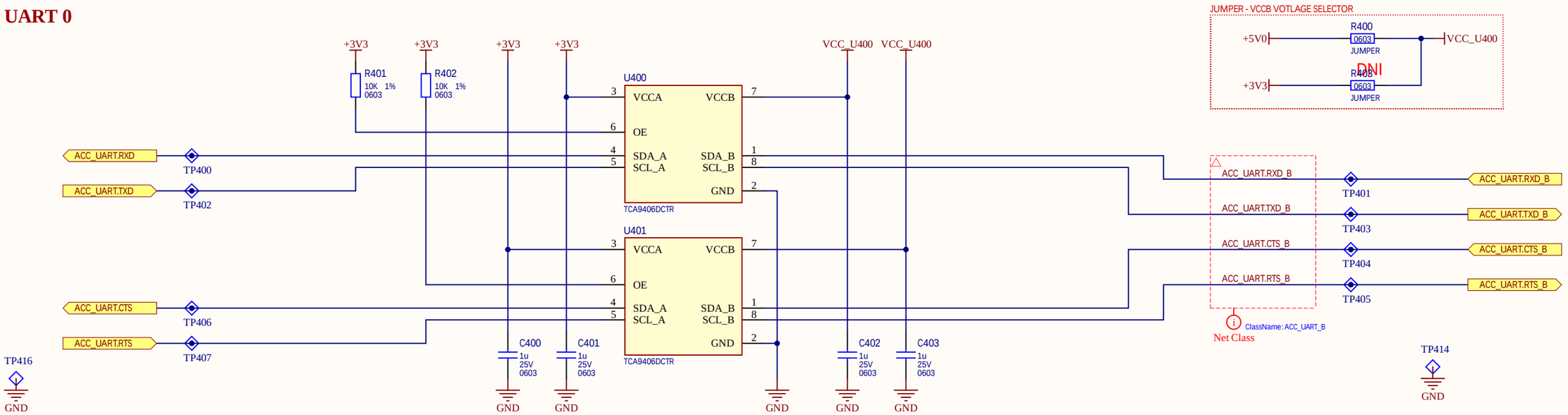
I2C1



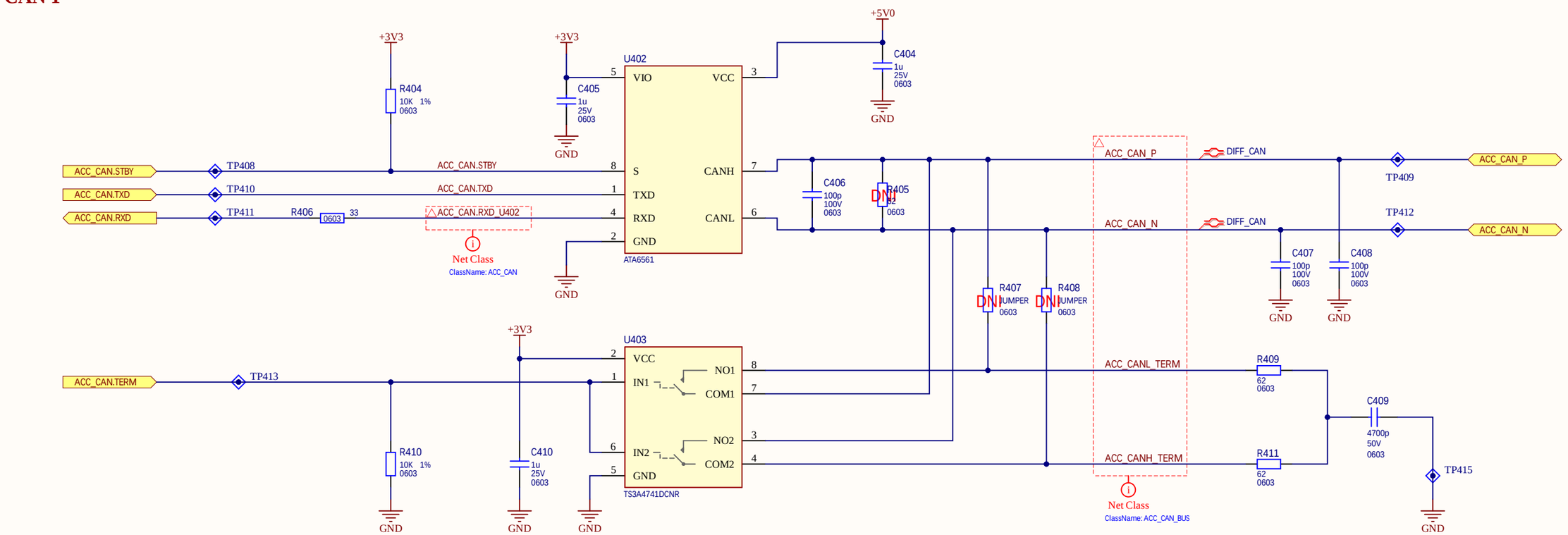
Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok Van Diemenstraat 292 1013 CR, Amsterdam The Netherlands
Size: A3	Sheet 16of 17 Version: 0	Revision: .3 Rev. date: *Param	
Project: LIDO	File: LIDO-HW.300.StatusLightInterface.SchDoc		

ID400 - ACCESORY INTERFACES

ACCESSORY DISPLAY
UART 0



ACCESSORY CAN BUS
CAN 1



Title: *			Dott (emTransit B.V.)
Date: 20/05/2022	Engineer: FG	Part Number: *xxxxx	Westerdok Van Diemenstraat 292 1013 CR, Amsterdam The Netherlands
Size: A3	Sheet 17of 17	Version: 0	Revision: .3 Rev. date: *Param
Project: LIDO		File: LIDO-HW.400.AccessoryInterfaces.SchDoc	