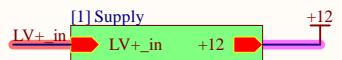
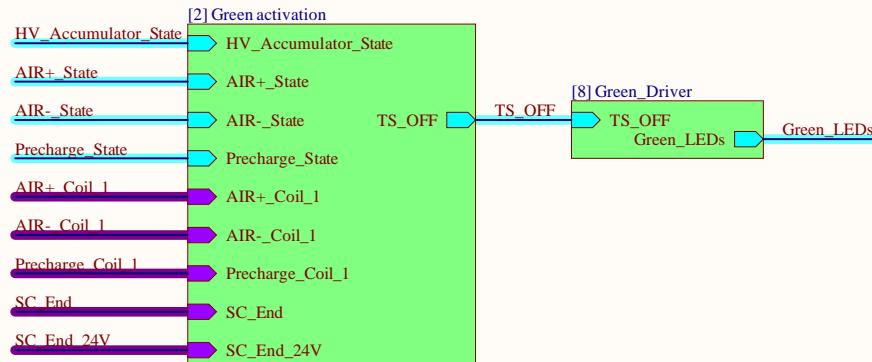
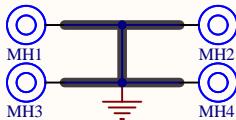


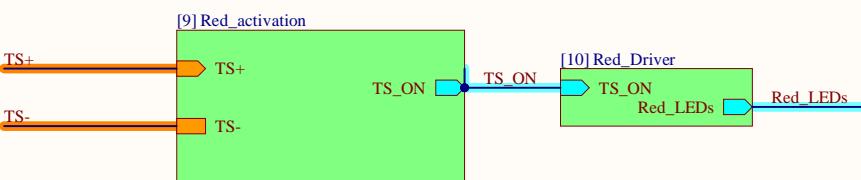
A



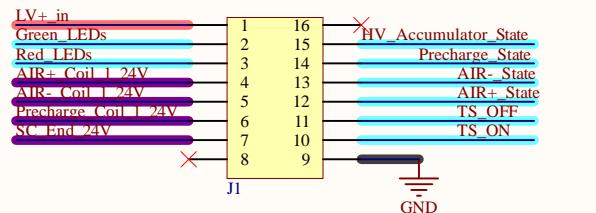
This PCB is installed in the power distribution box (HV Box) and is capable of controlling TSAL_Light according to 2023 FSG rules. It needs signals from AMS_Master (or TSAL_Dummy) and TSAL_Inverters. TS Voltage detection schematic [9] is DNP for 2023 but used in 2024 due to merging of inverter housings.



Signal	12V	1V	0V
Relay_AUX	relay is open	relay is closed	broken wire
HV_Accumulator_State	no voltage in accumulator	more than 60VDC in accumulator	broken wire
Relay_Coil_1	relay is open	N/A	relay is closed
INV_X_Red_ON	no voltage in inverters' box	more than 60VDC in inverters' box	broken wire



Cyan: External signal
Orange: High Voltage
Red: Untreated supply
Pink: Treated supply
Purple: Shutdown chain

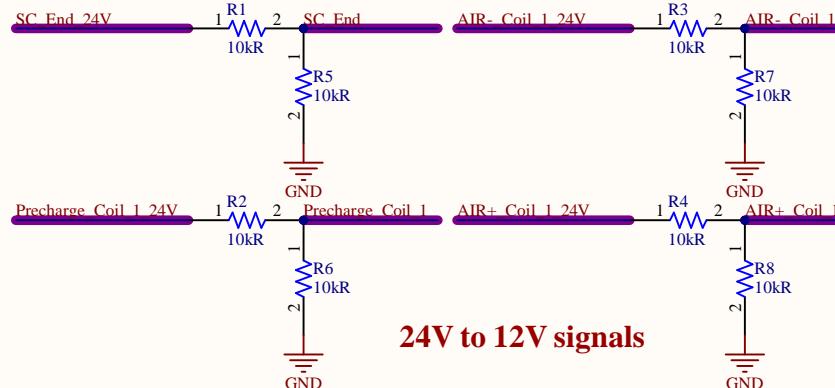


J_TS+_DC_BUS

TS+
F_DC_BUS
1 2
600V
1A

J_TS-
TS-
F_TS
1 2
600V
1A
TS-
TS-
Unfused

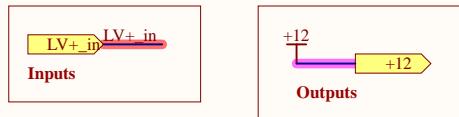
Connectors



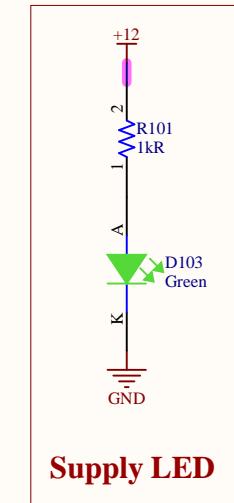
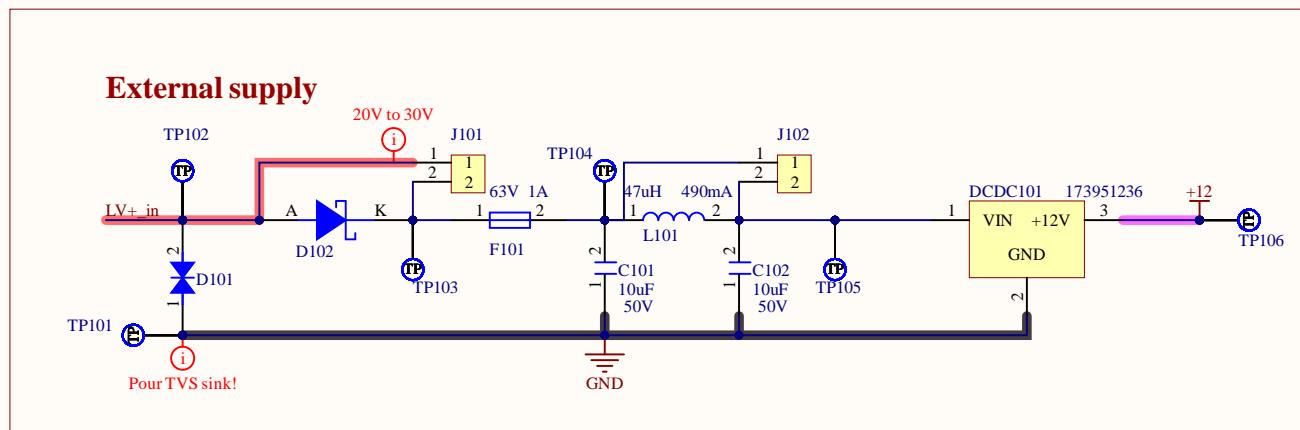
24V to 12V signals

Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: TSAL_Control.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillem Ropero	guillemropere@gmail.com	Sheet 1 of 11
Checked by:		Date: 27/11/2023	

A



B

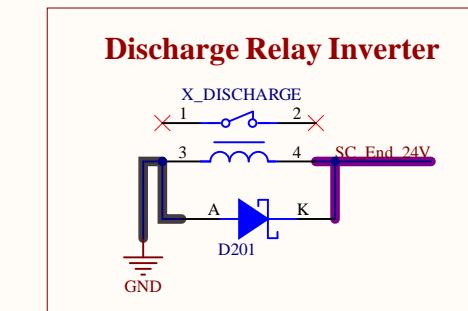
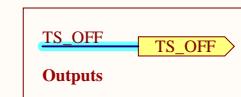
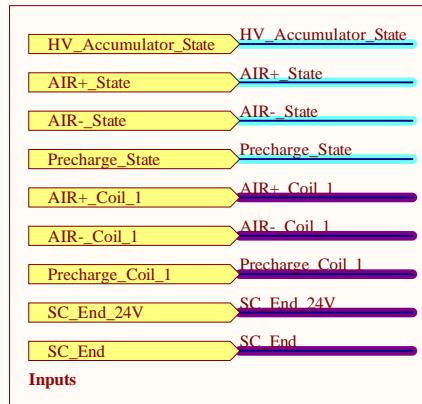


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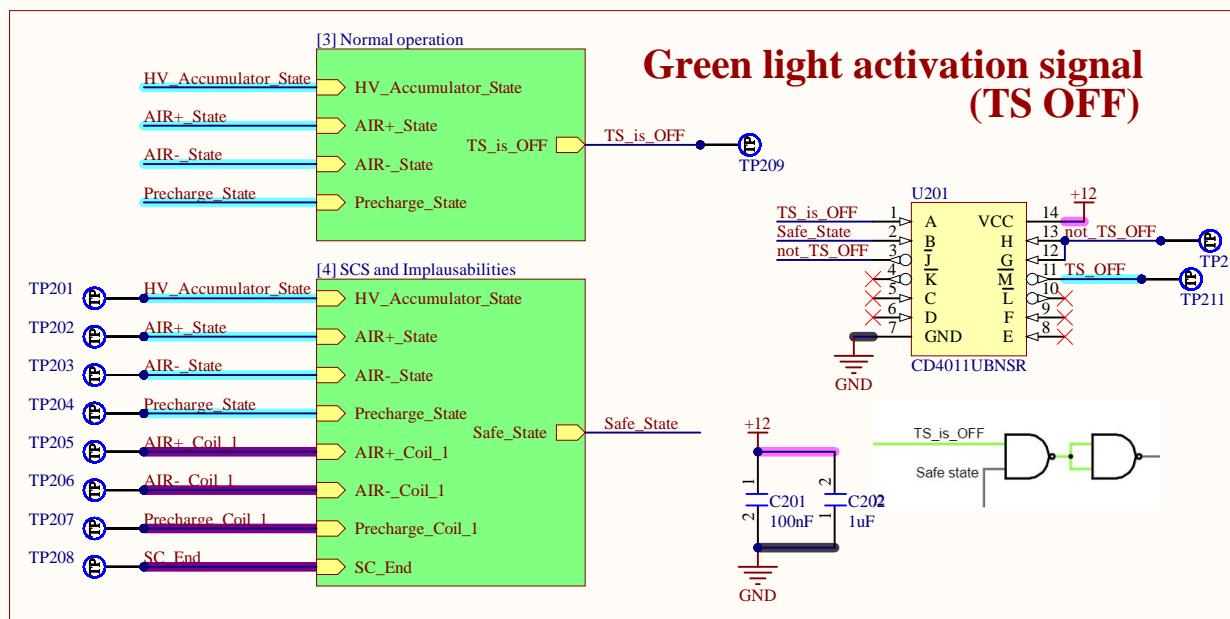
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Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [1]Supply.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillem Ropero	guillemropere@gmail.com	Sheet 2 of 11
Checked by:			Date: 27/11/2023

A



B

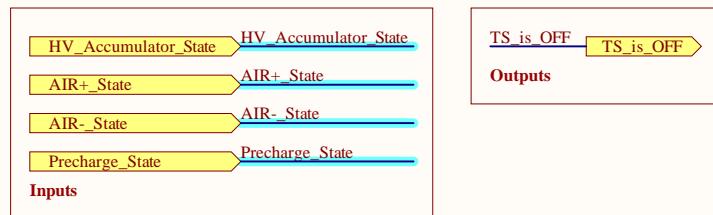


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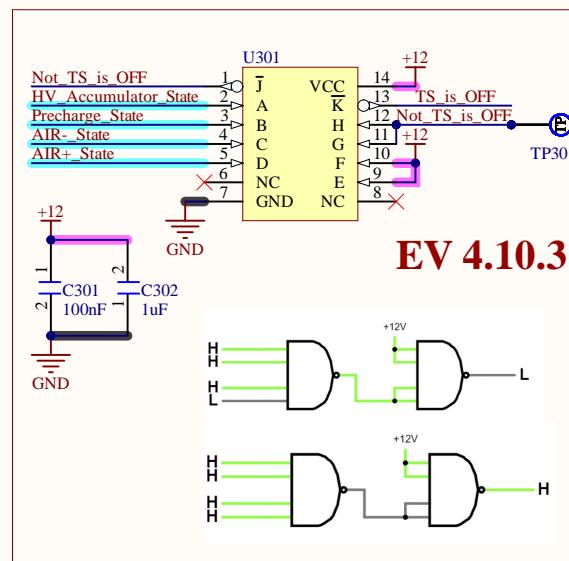
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Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [2] Green activation.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillen Ropero	guillemrproper@gmail.com	Sheet 3 of 11
Checked by:			Date: 27/11/2023

A



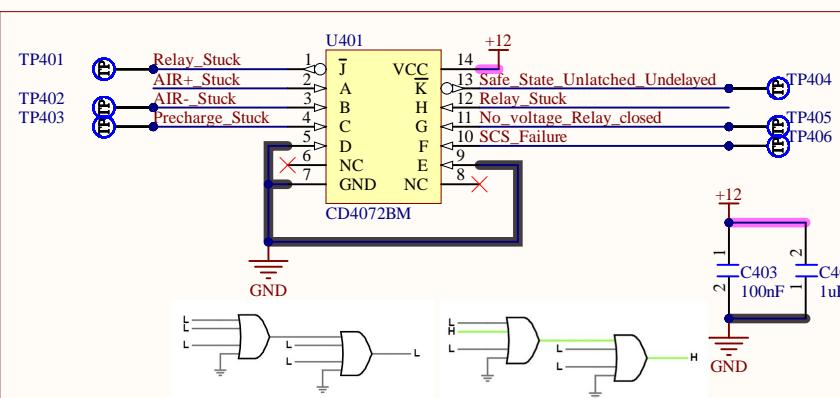
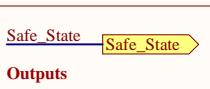
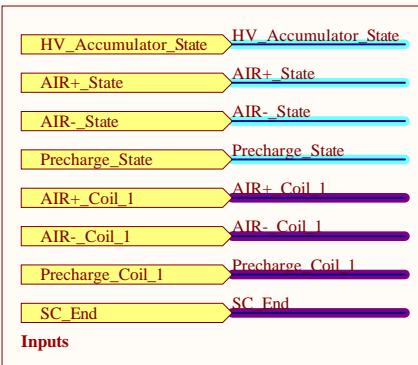
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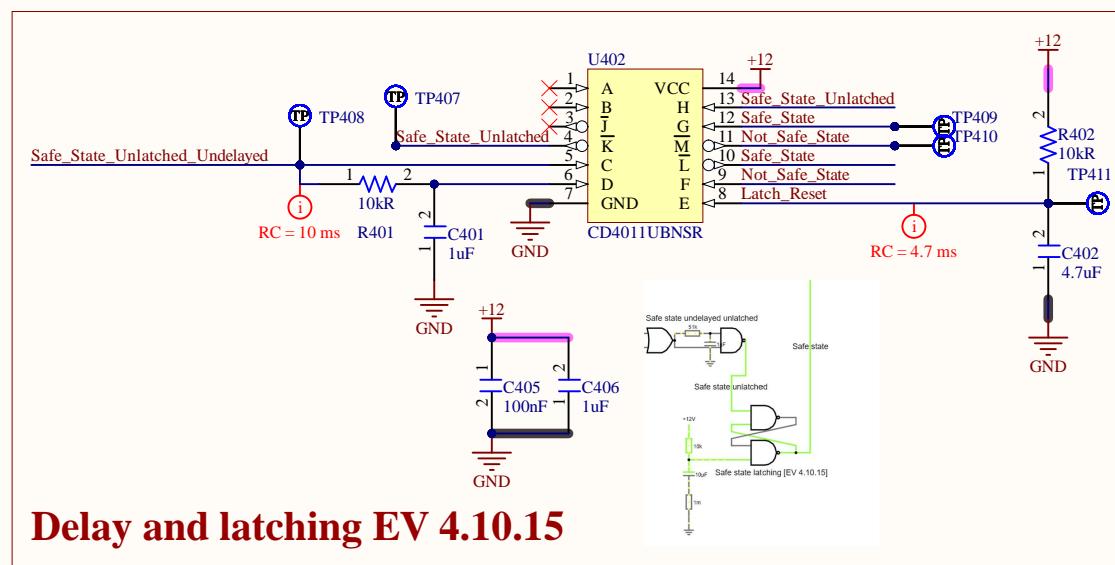
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D

Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [3]Normal operation.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillem Ropero	guillemropere@gmail.com	Sheet 4 of 11
Checked by:			Date: 27/11/2023



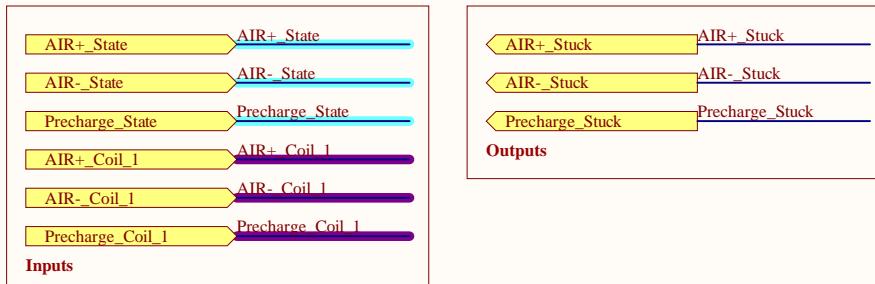
Implausibilities merging



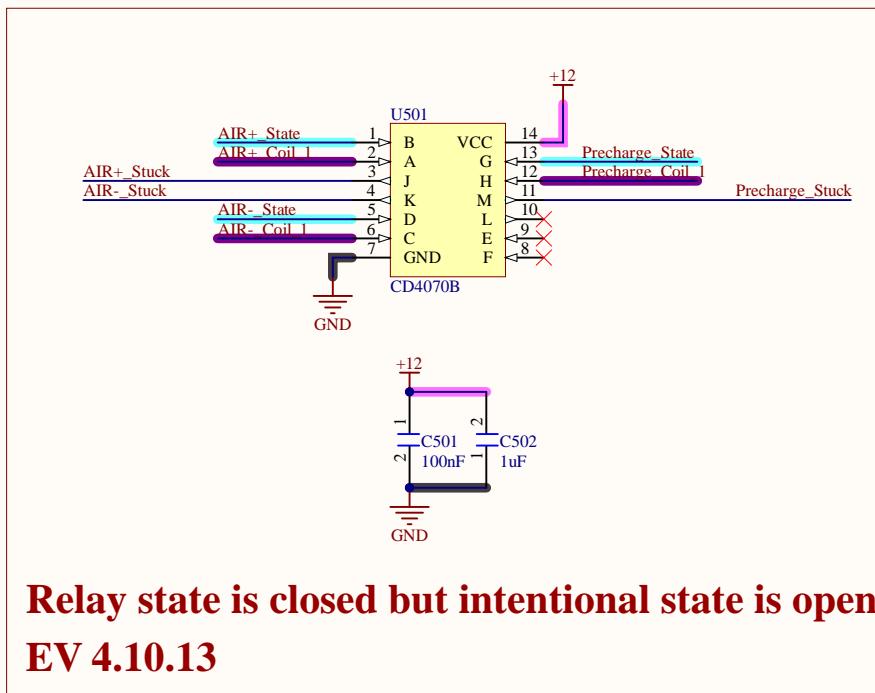
Delay and latching EV 4.10.15

Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [4] SCS and Implausibilities.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillermo Ropero	guillermo.ropero@gmail.com	Sheet 5 of 11
Checked by:		Date: 27/11/2023	

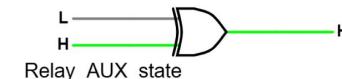
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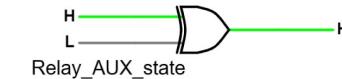
B



Relay_intentional_state



Relay_intentional_state

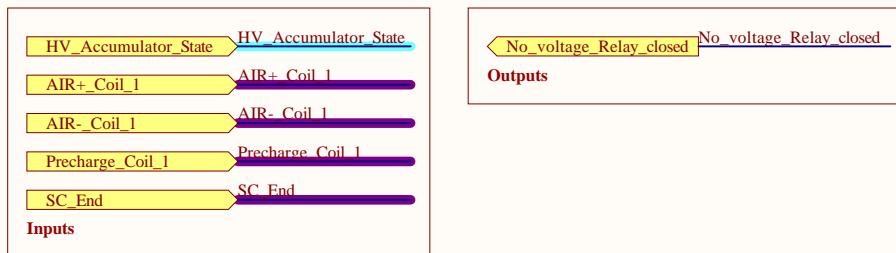


C

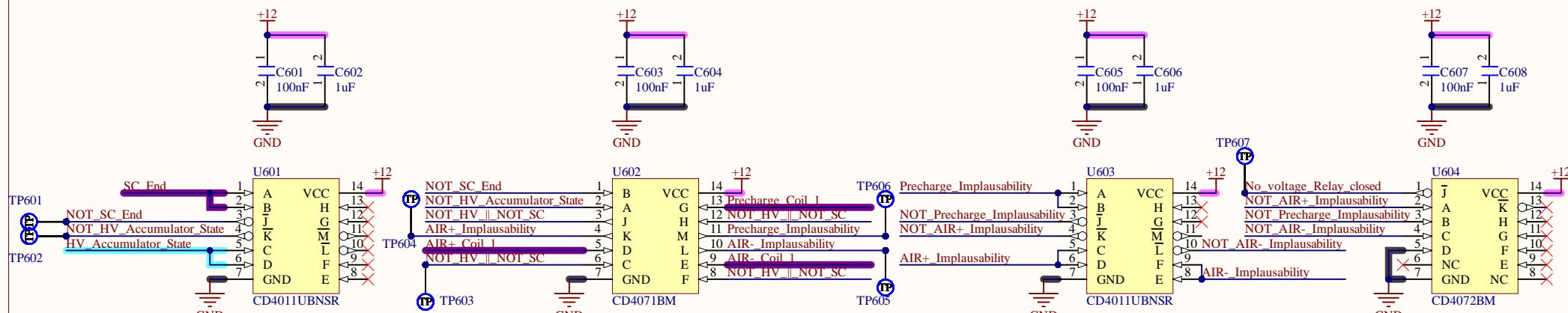
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Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [5] EV 4.10.13.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillem Ropero	guillemrproper@gmail.com	Sheet 6 of 11
Checked by:			Date: 27/11/2023

A

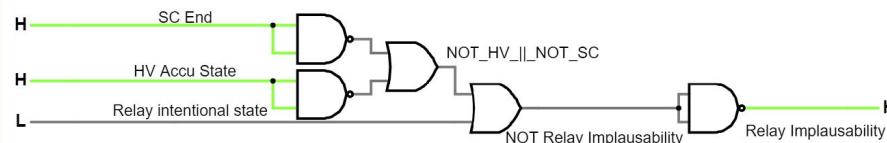


B



C

SC is closed, intentional state is closed but no voltage is present [EV 4.10.14]

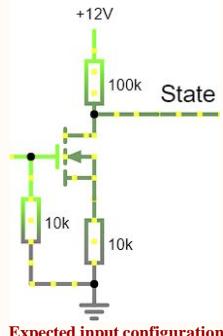
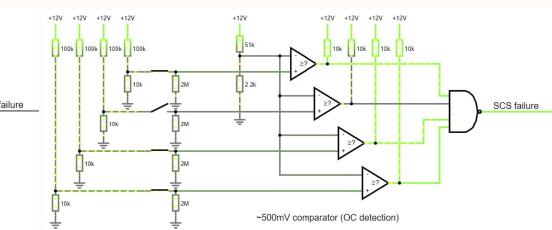
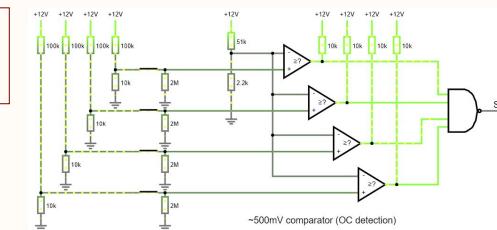
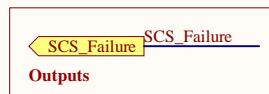
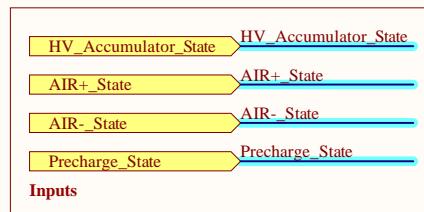


NOT_HV || NOT_SC is common for the three relays

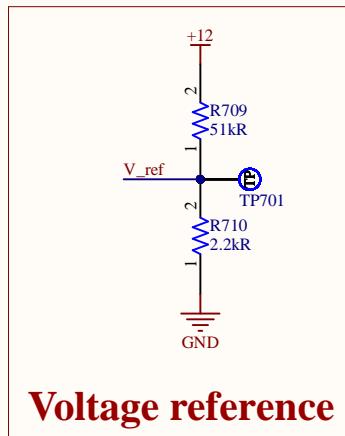
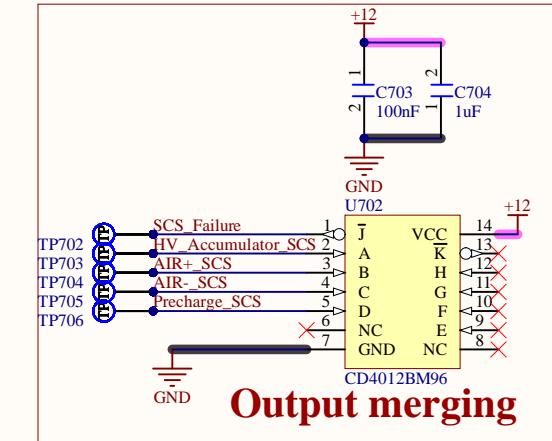
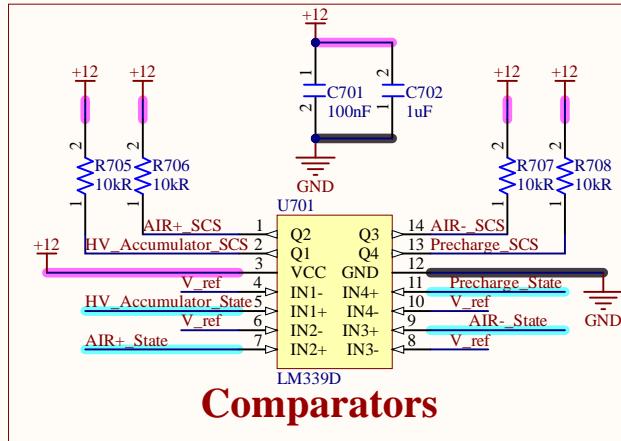
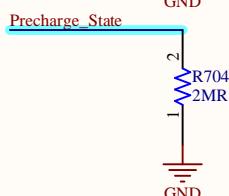
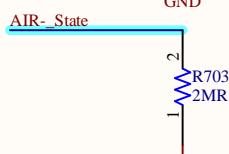
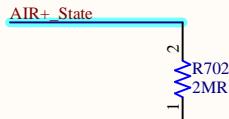
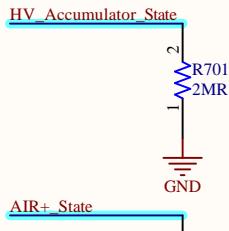
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Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [6]EV 4.10.14.SchDoc	Version: 6.0	
Author:	Guillen Ropero	guillemrproper@gmail.com	Department: Hardware
Checked by:		Sheet 7 of 11	Date: 27/11/2023

A



Inputs pull down



Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [7]SCS[T 11.9.2 (a)].SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillem Ropero	guillemropere@gmail.com	Sheet 8 of 11
Checked by:			Date: 27/11/2023

A

A

B

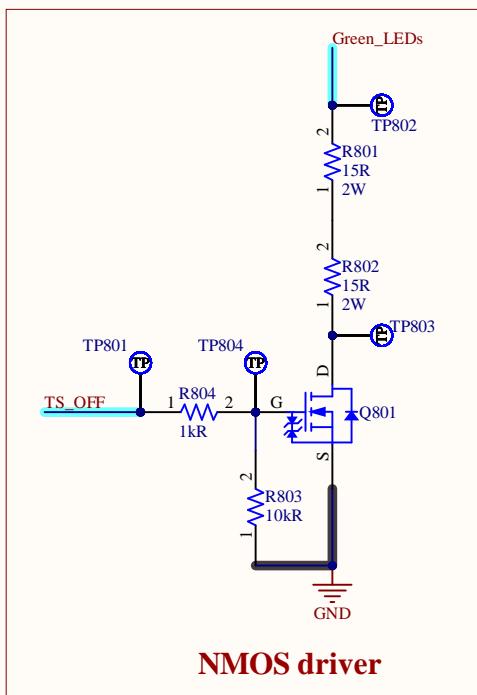
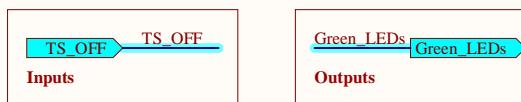
B

C

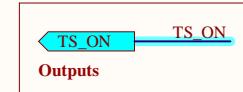
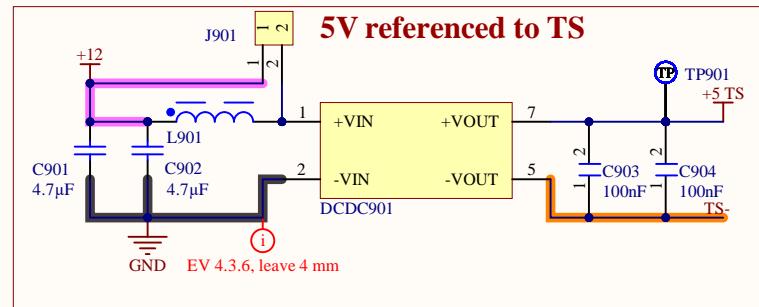
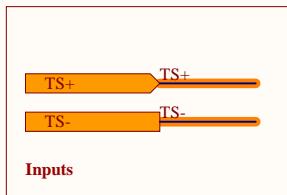
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D

D

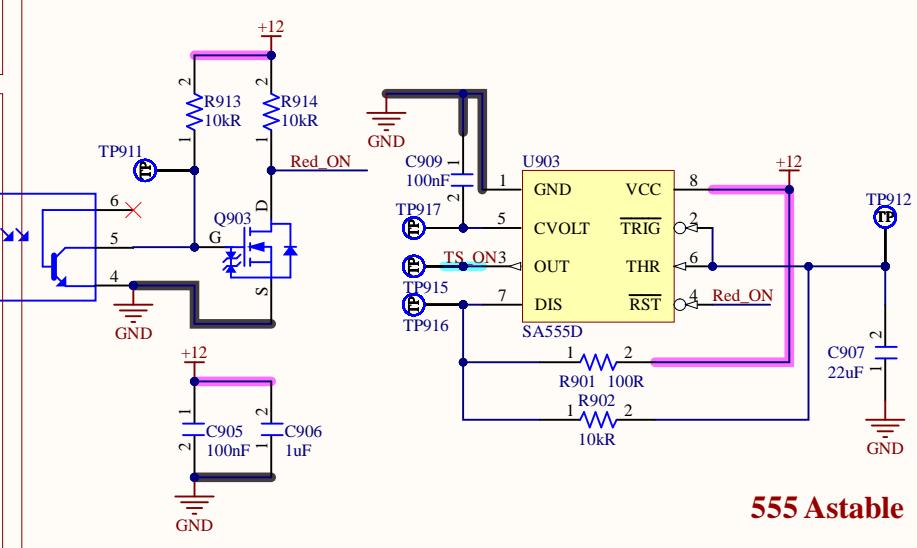
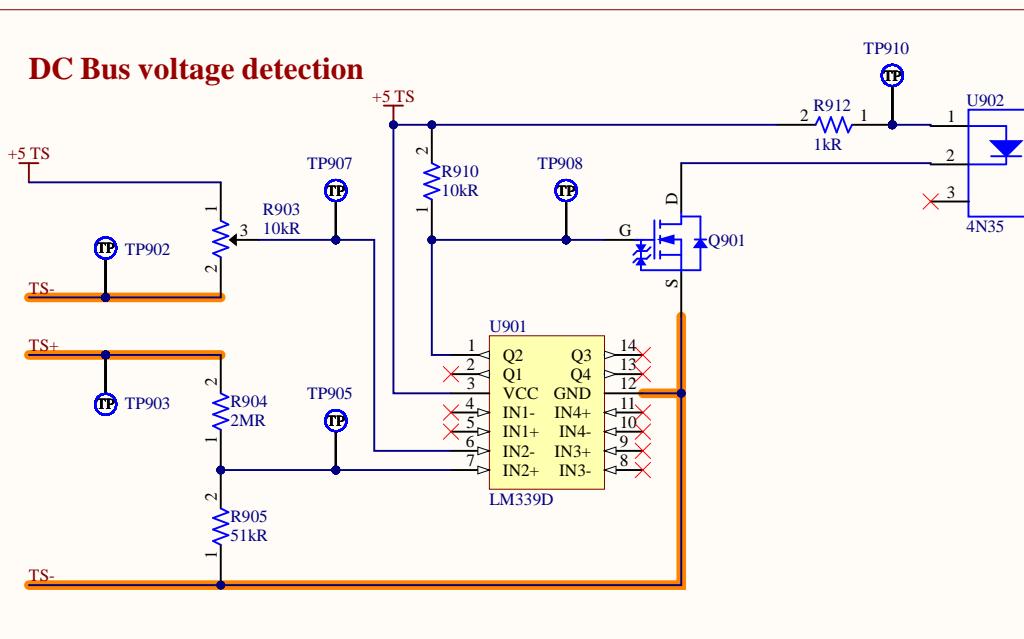


A



B

DC Bus voltage detection

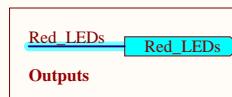
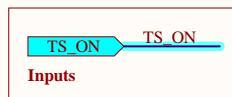


C

D

Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [9] Red_activation.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillermo Ropero	guillermo.ropero@gmail.com	Sheet 10 of 11
Checked by:			Date: 27/11/2023

A



B

C

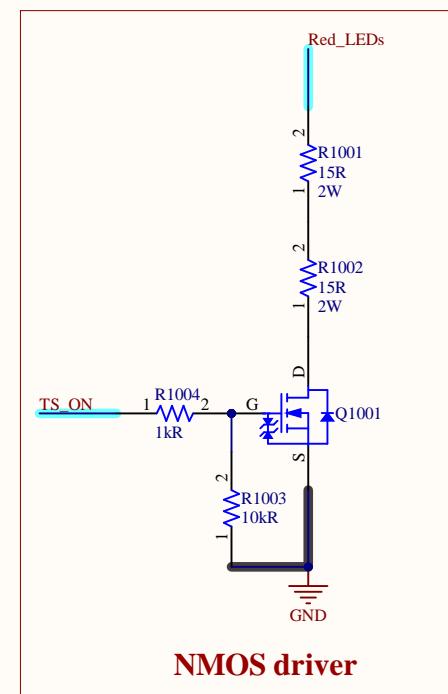
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A

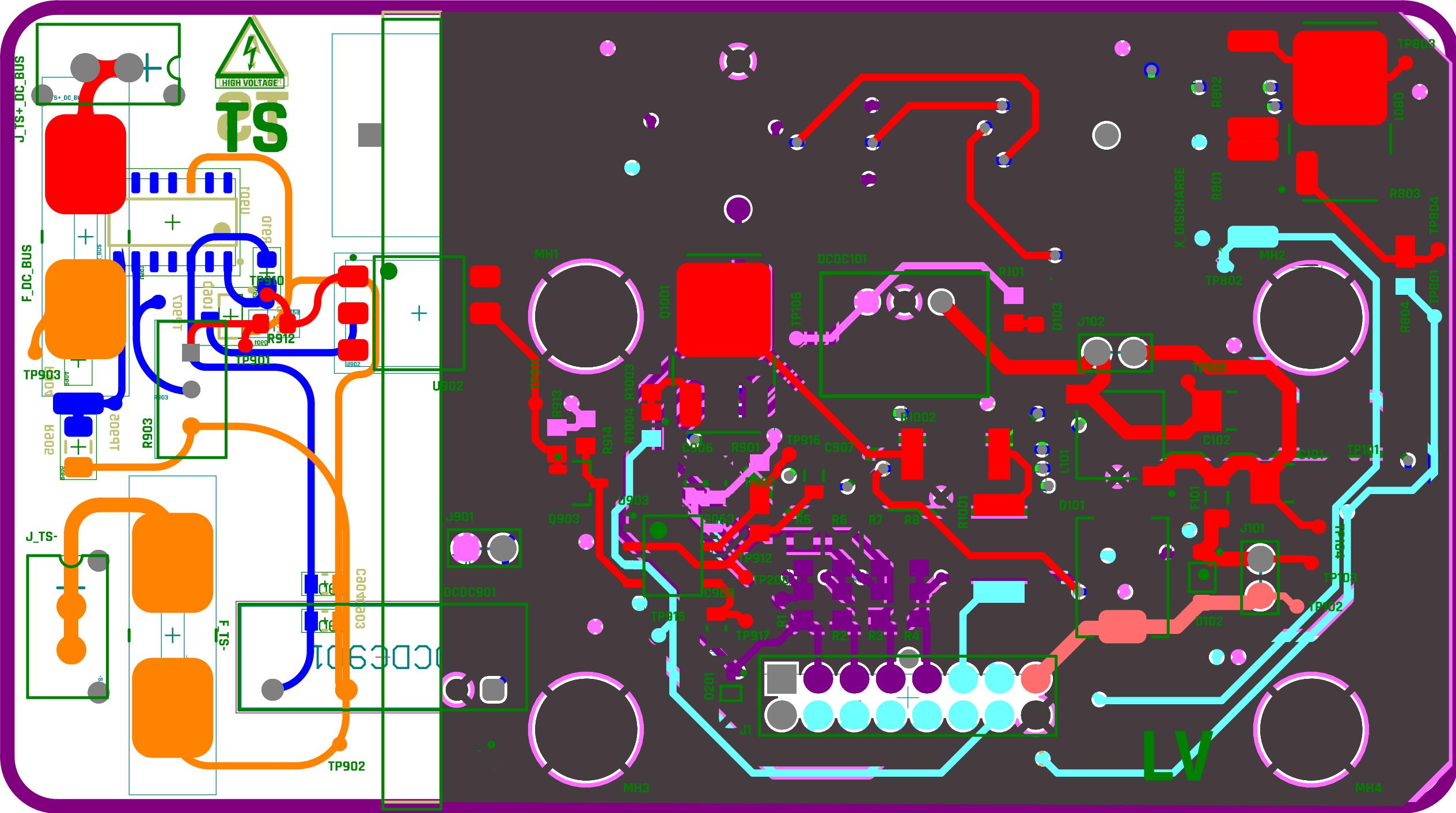
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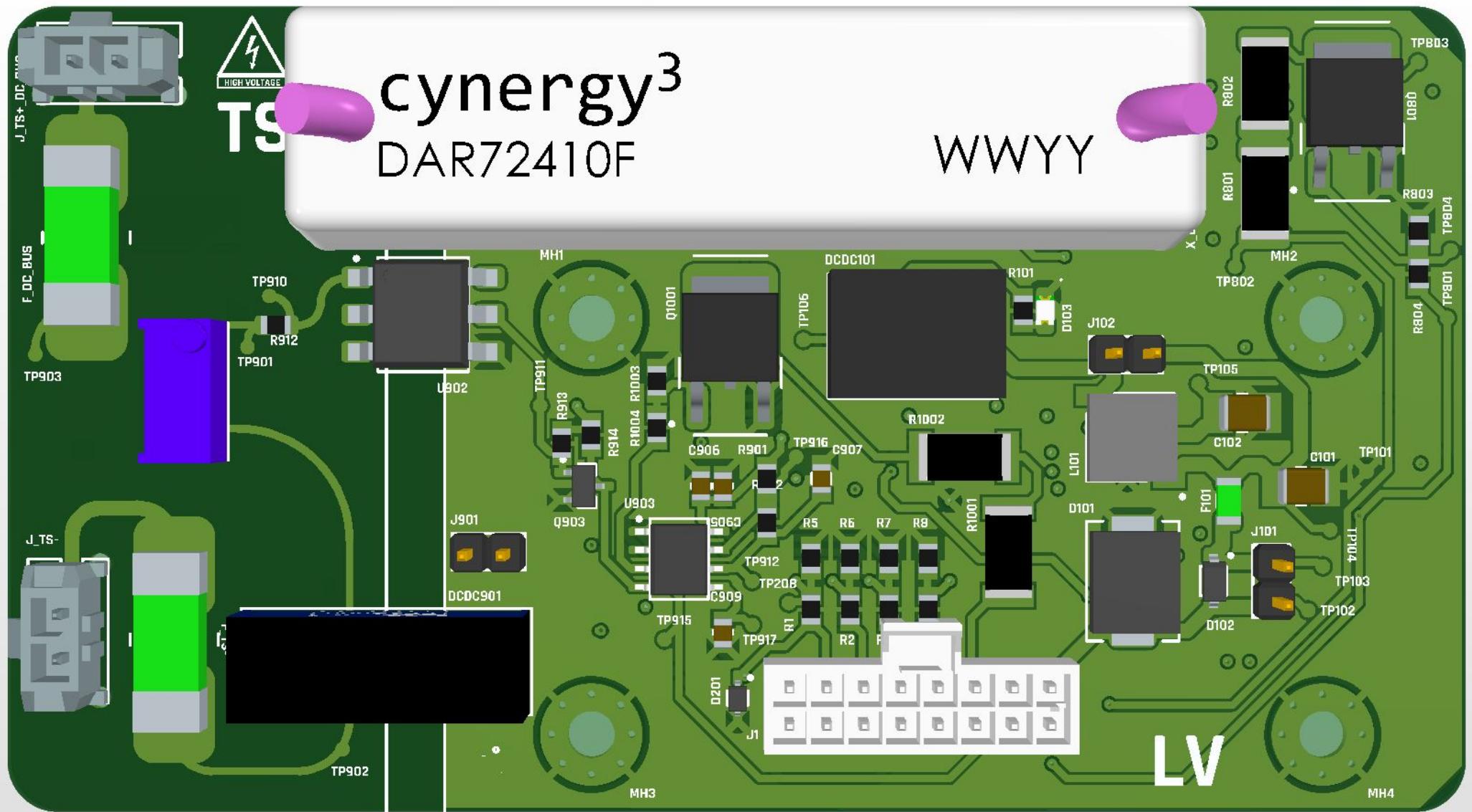
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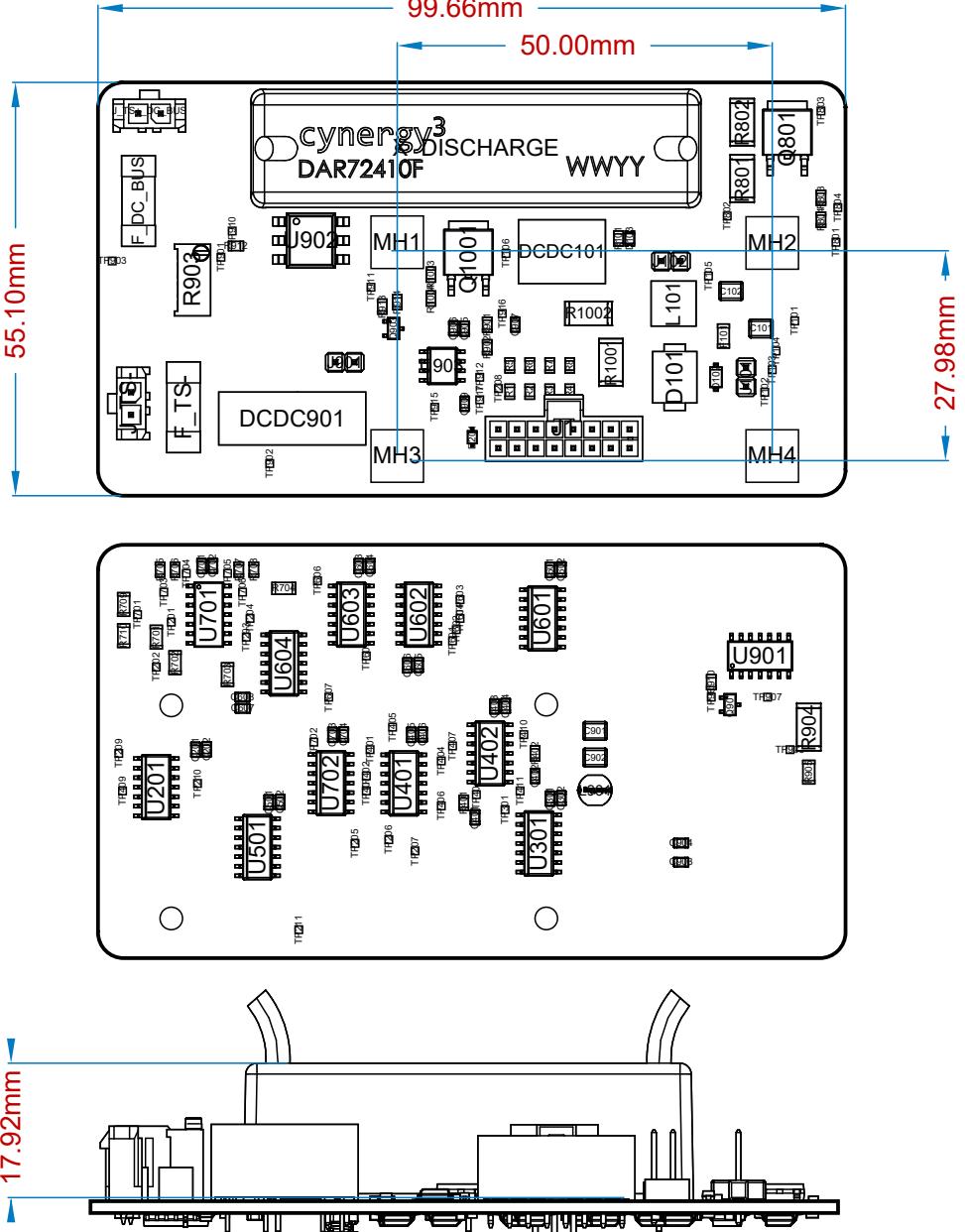
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Company:	e-Tech Racing	e-techracing.es	
Project:	TSAL_Control	Variant: [No Variations]	
Size:	Page Contents: [10] Red_Driver.SchDoc	Version: 6.0	
-		Department: Hardware	
Author:	Guillermo Ropero	guillermoropero@gmail.com	Sheet 11 of 11
Checked by:			Date: 27/11/2023







TSAL Control

Designator	Name	Quantity
C101, C102	GRJ32ER71H106KE11L	2
C201, C301, C403, C405, C501, C601, C603, C605, C607, C701, C703, C903, C904, C905, C909	885012207098	15
C202, C302, C401, C404, C406, C502, C602, C604, C606, C608, C702, C704, C906	885012207103	13
C402	GRM219R61A475KE34D	1
C901, C902	4.7µF	2
C907	885012107011	1
D101	824551301	1
D102	MBR0530	1
D103	150080VST5000	1
D201	CMDSH05-4 TR PBFREE	1
DCDC101	173951236	1
DCDC901	12Vin, 5Vout	1
F101	0437001.WRA	1
F_DC_BUS, F_TS-	485001	2
J1	1053101116	1
J101, J102, J901	61300211121	3
J_TS-, J_TS+ DC_BUS	436500215	2
L101	CDC5D23BNP-470KC	1
L901	22µH, 1A	1
MH1, MH2, MH3, MH4	Mounting_Hole_M3	4
Q801, Q1001	IRFR3410PbF	2
Q901, Q903	SQ2318BES-T1_GE3	2
R1, R2, R3, R4, R5, R6, R7, R8, R401, R402, R705, R706, R707, R708, R803, R902, R910, R913, R914, R1003	CR0805-JW-103ELF	20
R101, R804, R912, R1004	CR0805-JW-102ELF	4
R701, R702, R703, R704	HVC1206-2M0FT3	4
R709, R905	CRCW120610K0FKEA	2
R710	CR1206-FX-2201ELF	1
R801, R802, R1001, R1002	352115RFT	4
R901	CR0805-FX-1000ELF	1
R903	3296W-1-103LF	1
R904	R2M-2512FTK	1
U201	CD4011UBSNR	4
U501	CD4012BM96	2
U601	CD4072BM	2
U602	Array_4x2_XOR	1
U701	CD4071BM	1
U901	LM339D	1
U902	LM339D	1
U903	4N35	1
X_DISCHARGE	SA555	1
	DBR72410FU	1

Material	Layer	Thickness
Surface Material	Top Overlay	
Copper	Top Layer	0.04mm
Prepreg		0.10mm
Prepreg		0.10mm
CF-001	GND	0.02mm
CF-001	PWR	1.05mm
Prepreg		0.02mm
Prepreg		0.10mm
Copper	Bottom Layer	0.04mm
Surface Material	Bottom Overlay	
	Bottom Solder	0.01mm

Total thickness: 1.57mm