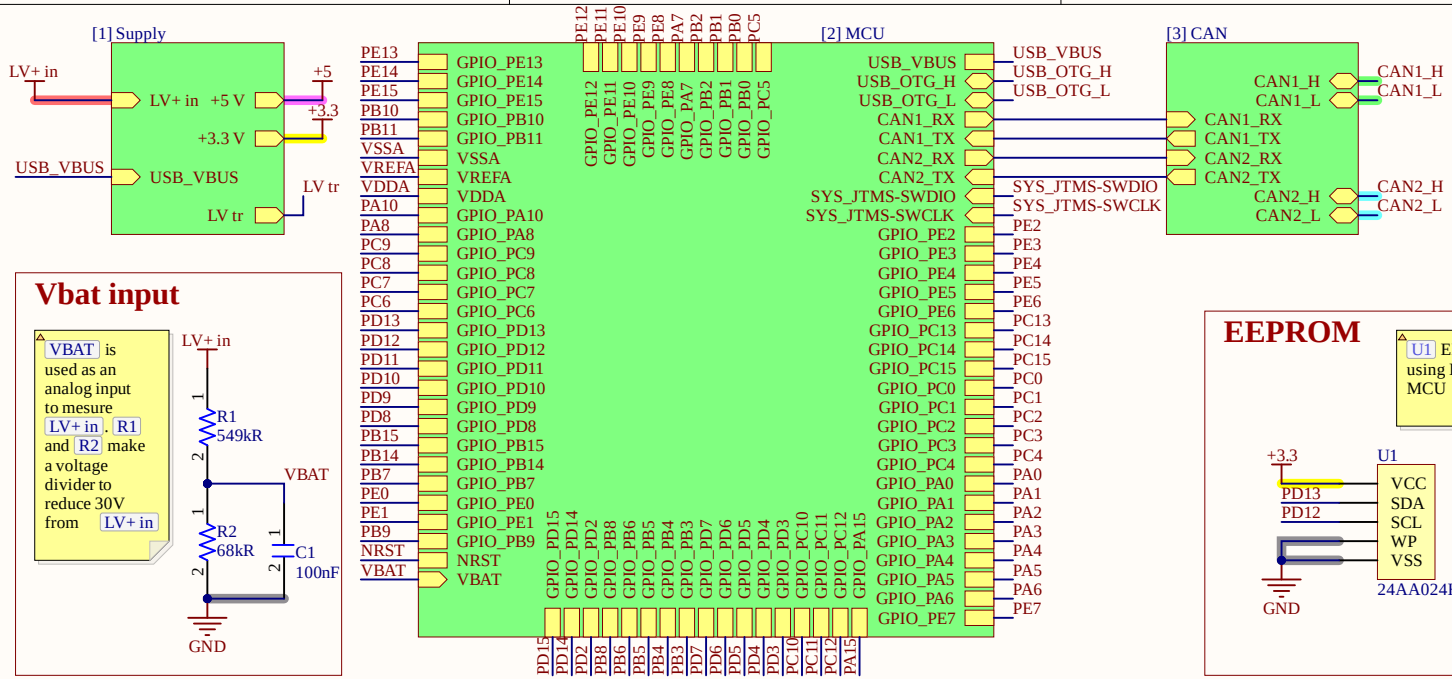


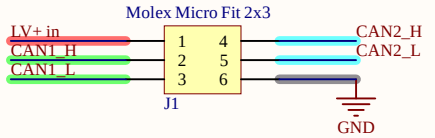
Vbat input

VBAT is used as an analog input to mesure LV+ in. R1 and R2 make a voltage divider to reduce 30V from LV+ in

EEPROM

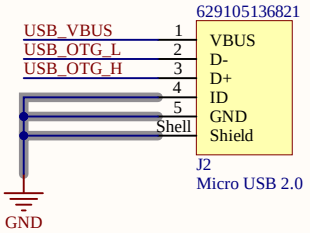
U1 EEPROM is using I2C4 of MCU

Supply&CAN connector



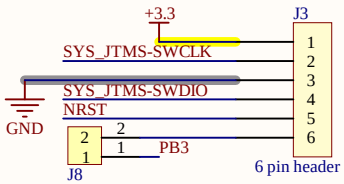
USB connector

USB_VBUS is used as a 5V input supply when board not supplied externaly

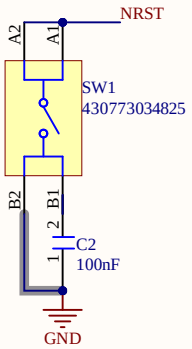


Flashing connector

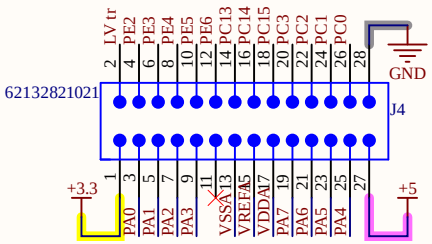
J8 jumper for optional SWO (PB3) pin to STLINK



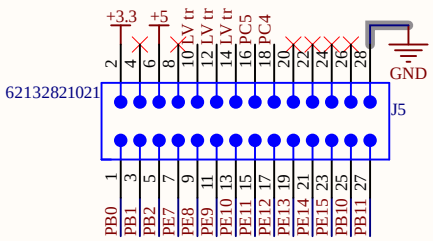
Reset switch (NRST)



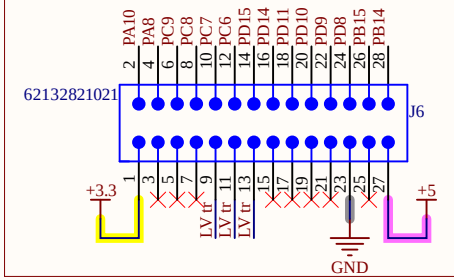
Pin header 1



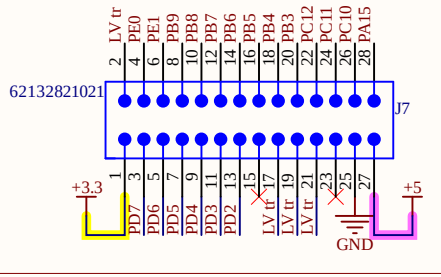
Pin header 2



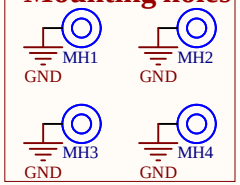
Pin header 3



Pin header 4



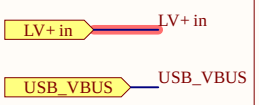
Mounting holes



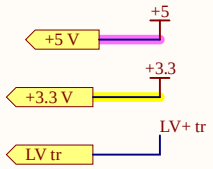
Company: e-Tech Racing	e-techracing.es		
Project: SHIELD	Variant: [No Variations]		
Size: -	Page Contents: ETRX_Shield.SchDoc	Version: 1.0	
		Department: Hardware	
Author: Bernat Costa Cesari	bernat.costa.cesari@estudiantat.upc.edu	Sheet 1 of 4	
Checked by: Andreu Senis		Date: 19/11/2023	

Pi filter composed with C102, C103 and L101 is calculated to be cutting all frequencies higher than 7340 Hz

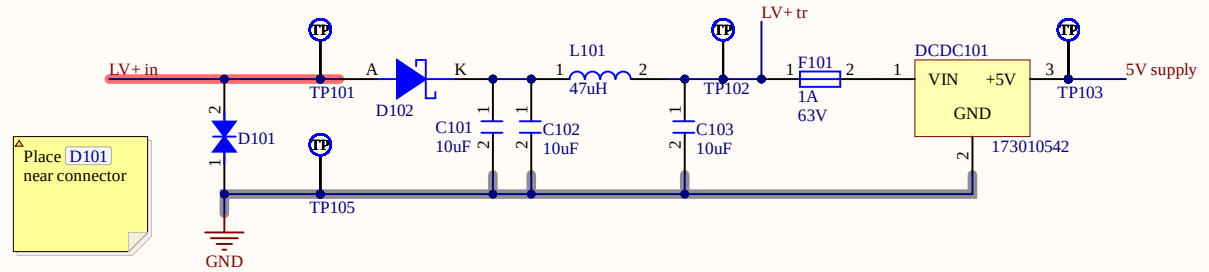
Inputs



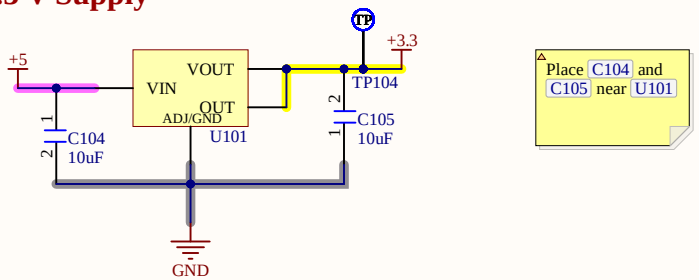
Outputs



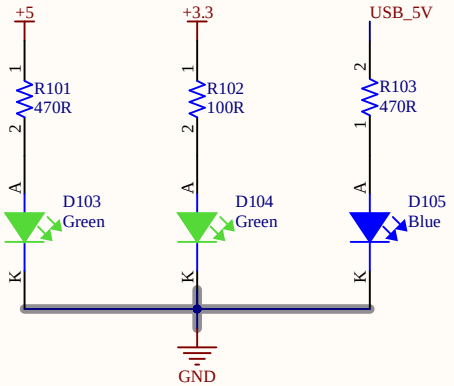
5 V Supply



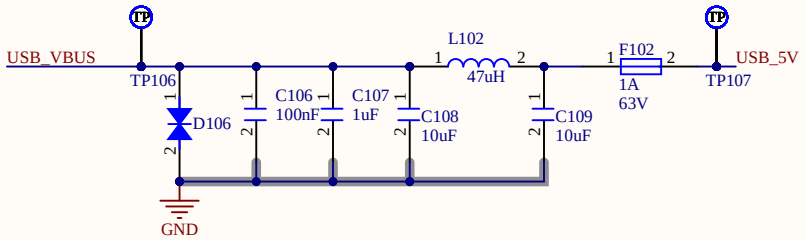
3.3 V Supply



LEDs

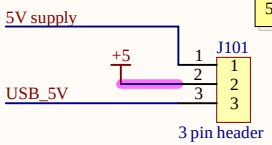


USB Supply

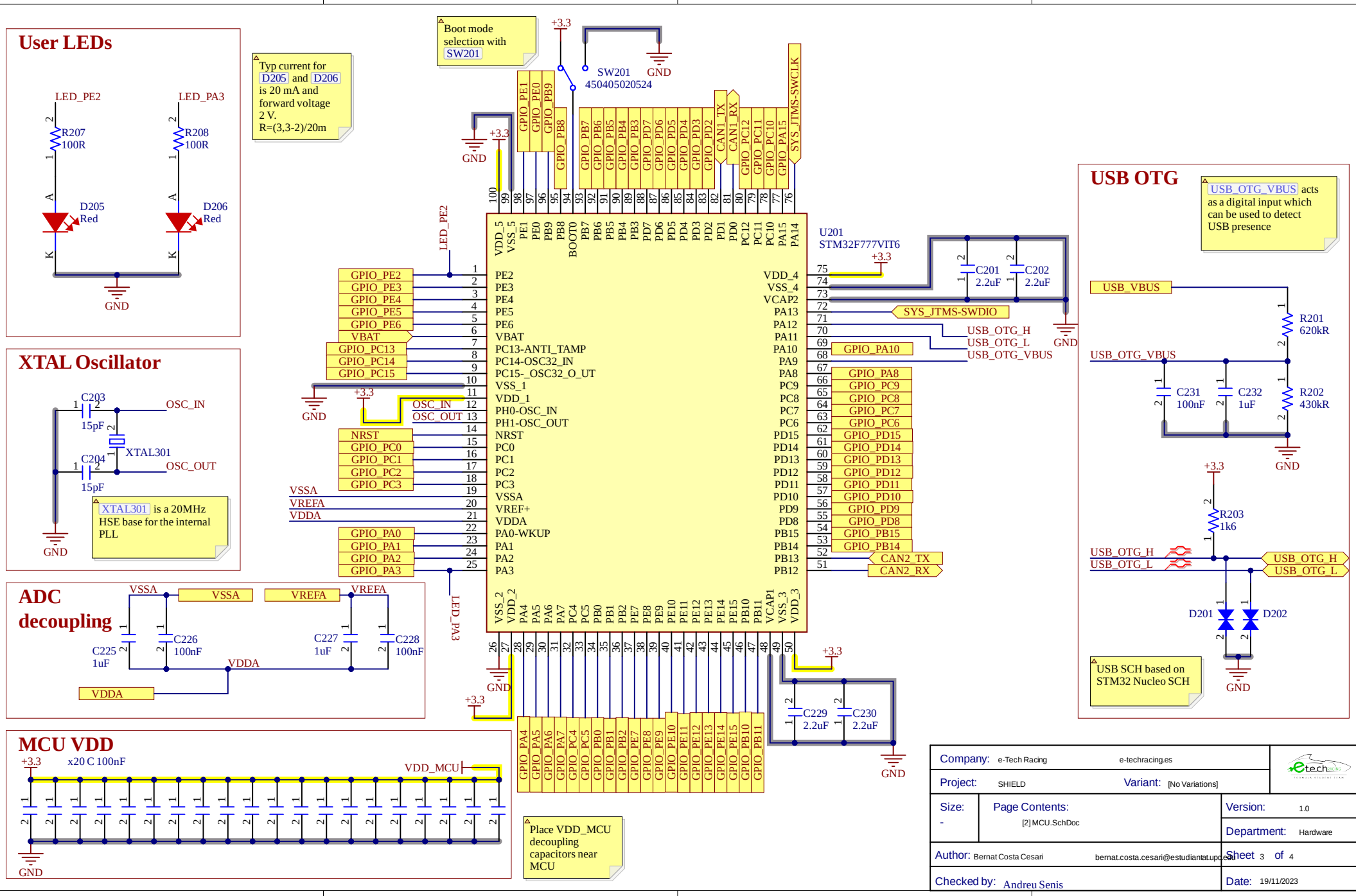


Supply selection

Supply selection via J101. Position 1 of the jumper shortcircuits 5V from DCDC to 5V board bus. Position 2 shorcircuits the USB supply to the 5V bus.



Company: e-Tech Racing	e-techracing.es	
Project: SHIELD	Variant: [No Variations]	
Size: -	Page Contents: [1] Supply.SchDoc	Version: 1.0
		Department: Hardware
Author: Bernat Costa Cesari	bernat.costa.cesari@estudiantat.upc.edu	Sheet 2 of 4
Checked by: Andreu Senis		Date: 19/11/2023


User LEDs
LED_PE2
LED_PA3
R207 100R
R208 100R
D205 Red
D206 Red
GND
Typ current for D205 and D206 is 20 mA and forward voltage 2 V. R=(3,3-2)/20m
Boot mode selection with SW201
SW201 450405020524
XTAL Oscillator
C203 15pF
C204 15pF
XTAL301
OSC_IN
OSC_OUT
XTAL301 is a 20MHz HSE base for the internal PLL
ADC decoupling
C225 1uF
C226 100nF
C227 1uF
C228 100nF
VSSA
VREFA
VDDA
MCU VDD
x20 C 100nF
VDD_MCU
Place VDD_MCU decoupling capacitors near MCU
U201
STM32F777VIT6
C201 2.2uF
C202 2.2uF
C229 2.2uF
C230 2.2uF
SYS_JTMS-SWDIO
USB_OTG_H
USB_OTG_L
USB_OTG_VBUS
CAN1_TX
CAN1_RX
CAN2_TX
CAN2_RX
USB OTG
USB_OTG_VBUS acts as a digital input which can be used to detect USB presence
USB_VBUS
R201 620kR
R202 430kR
C231 100nF
C232 1uF
R203 1k6
D201
D202
USB SCH based on STM32 Nucleo SCH
Company: e-Tech Racing
e-techracing.es
Project: SHIELD
Variant: [No Variations]
Size: -
Page Contents: [2] MCU.SchDoc
Version: 1.0
Department: Hardware
Author: Bernat Costa Cesari
bernat.costa.cesari@estudiantat.upc.edu
Sheet 3 of 4
Checked by: Andreu Senis
Date: 19/11/2023

CAN 1

CAN1_H — CAN1_H

CAN1_L — CAN1_L

CAN 2

CAN2_H — CAN2_H

CAN2_L — CAN2_L

Inputs

CAN1_RX — CAN1_RX

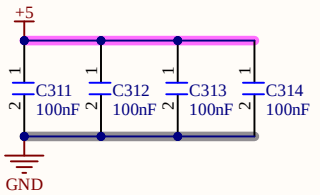
CAN2_RX — CAN2_RX

Outputs

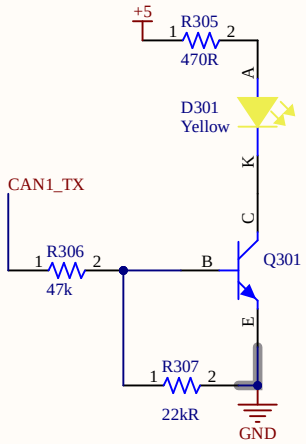
CAN1_TX — CAN1_TX

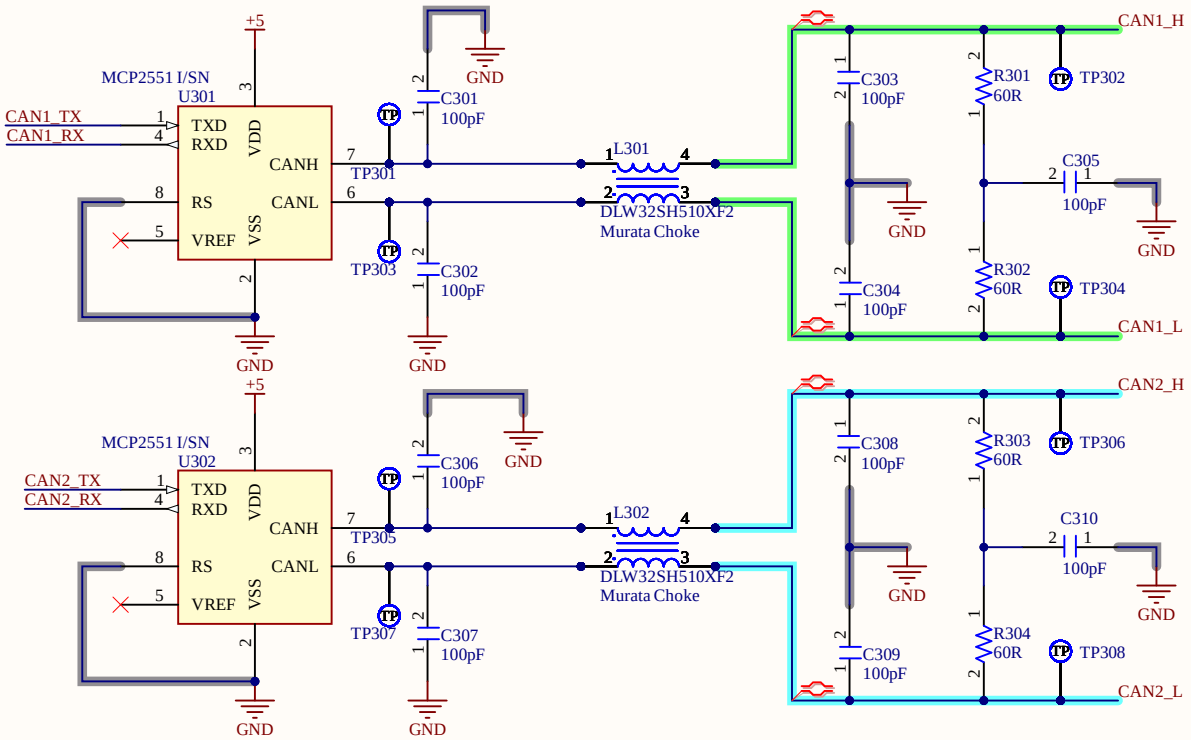
CAN2_TX — CAN2_TX

CAN decoupling

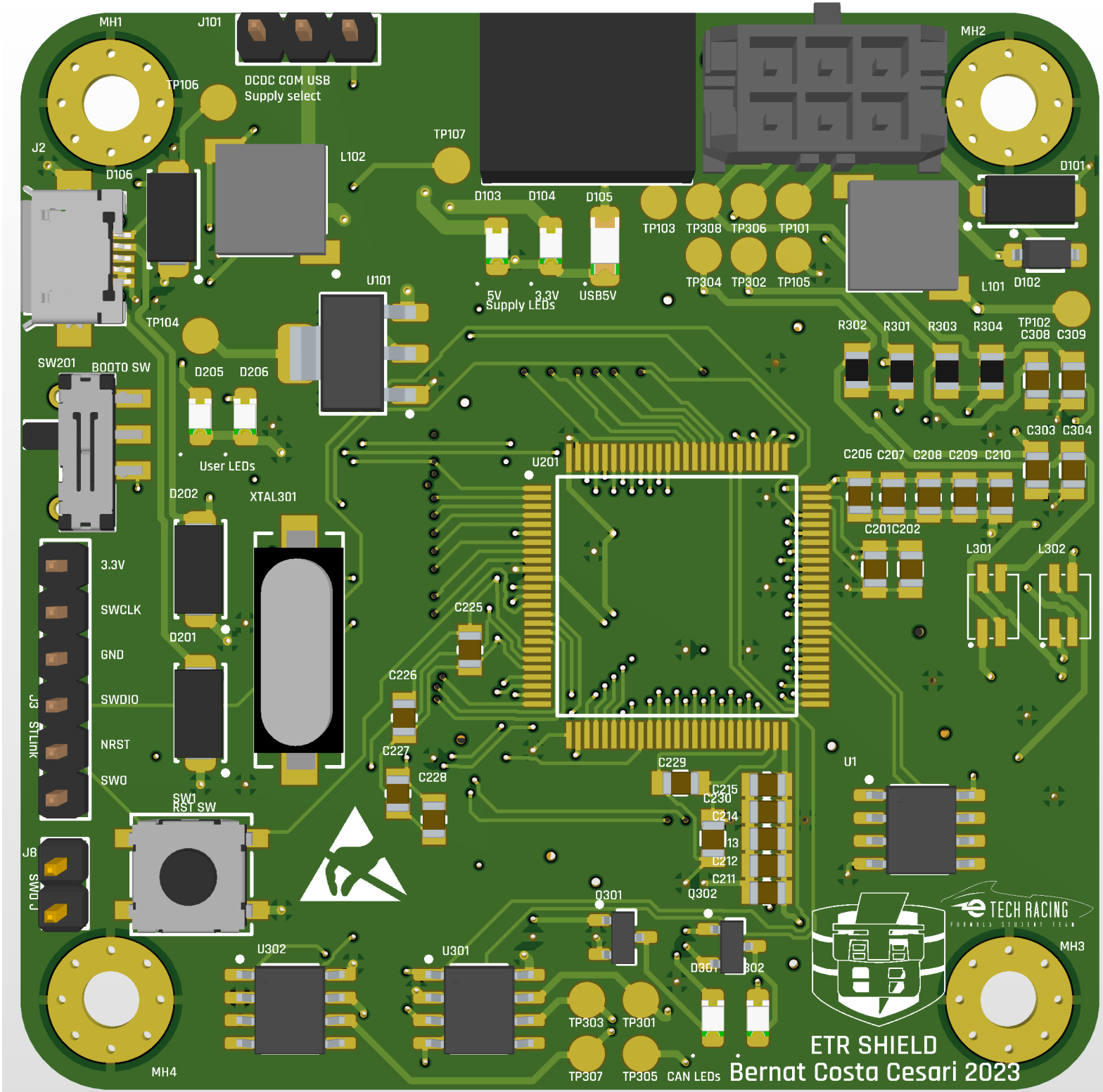


CAN LEDs



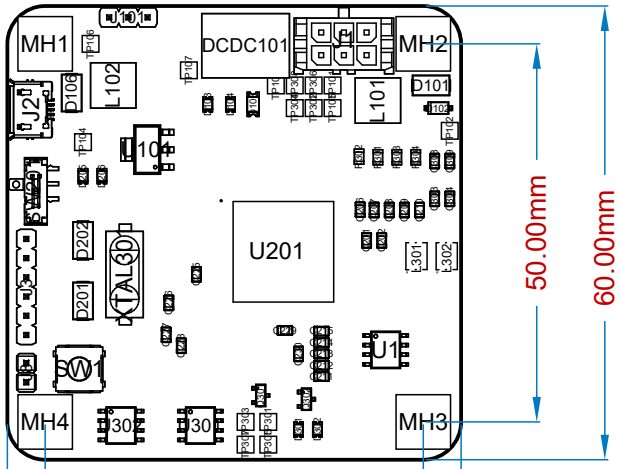


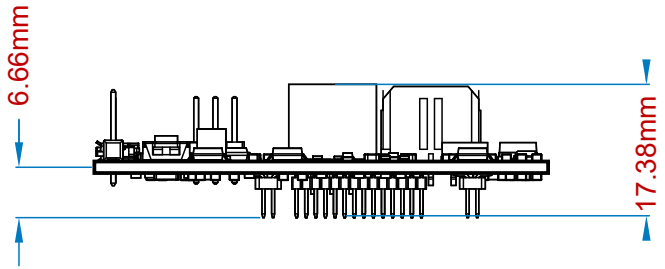
Company: e-Tech Racing	e-techracing.es	
Project: SHIELD	Variant: [No Variations]	
Size: -	Page Contents: [3] CAN.SchDoc	Version: 1.0
		Department: Hardware
Author: Bernat Costa Cesari	bernat.costa.cesari@estudiantat.upc.edu	Sheet 4 of 4
Checked by: Andreu Senis		Date: 19/11/2023


MH1
J101
DCDC COM USB
Supply select
TP106
MH2
J2
D106
L102
TP107
D103
D104
D105
TP103
TP308
TP306
TP101
TP304
TP302
TP105
D101
L101
D102
5V
3.3V
USB5V
Supply LEDs
U101
TP104
R302
R301
R303
R304
TP102
C308
C309
SW201
BOOT0 SW
D205
D206
C303
C304
C206
C207
C208
C209
C210
User LEDs
U201
D202
XTAL301
C201
C202
L301
L302
3.3V
SWCLK
GND
SWDIO
NRST
SWO
J3 STLink
C225
D201
C226
C227
C228
C229
U1
C215
C230
C214
C213
C212
C211
Q302
SW1
RST SW
J8
SWO J
Q301
TECH RACING
FORMULA STUDENT TEAM
MH3
U302
U301
D301
TP303
TP301
TP307
TP305
CAN LEDs
MH4
ETR SHIELD
Bernat Costa Cesari 2023

ETR SHIELD

TECH RACING
FORMULA STUDENT TEAM





Line #	Designator	Comment	Quantity
1	C1, C106, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217, C218, C219, C220, C221, C222, C223, C224, C226, C228, C231, C311, C312, C313, C314	885012207098	29
2	C2	885012208058	1
3	C101, C102, C103, C108, C109	10uF	5
4	C104, C105	885012107014	2
5	C107, C225, C227, C232	885012207103	4
6	C201, C202, C229, C230	2.2uF	4
7	C203, C204	885012007052	2
8	C301, C302, C303, C304, C305, C306, C307, C308, C309, C310	885012007057	10
9	D101	824501261	1
10	D102	MBR0530	1
11	D103, D104	150080GS75000	2
12	D105	150120BS75000	1
13	D106	824501131	1
14	D201, D202	824501600	2
15	D205, D206	150080RS75000	2
16	D301, D302	150080YS75000	2
17	DCDC101	173010542	1
18	F101, F102	0437001.WRA	2
19	J1	Molex Micro Fit 2x3	1
20	J2	629105136821	1
21	J3	6 pin header	1
22	J4, J5, J6, J7	62132821021	4
23	J8	61300211121	1
24	J101	3 pin header	1
25	L101, L102	47uH	2
26	L301, L302	DLW32SH510XF2	2
27	MH1, MH2, MH3, MH4	Mounting_Hole_M3	4
28	Q301, Q302	BC817-25LT1G	2
29	R1	549kR	1
30	R2	CR1206AFX-6802EAS	1
31	R101, R103, R305, R308	CR0805-FX-4700GLF	4
32	R102, R207, R208	CR0805-FX-1000ELF	3
33	R201	620kR	1
34	R202	430kR	1
35	R203	CRCW12061K60FKEA	1
36	R301, R302, R303, R304	R60-0805FTN	4
37	R306, R309	47k	2
38	R307, R310	22kR	2
39	SW1	430773034825	1
40	SW201	450405020524	1
41	U1	24AA024H-I/SN	1
42	U101	LM1117IMP-3.3/NOPB	1
43	U201	STM32F777VIT6	1
44	U301, U302	MCP2551 I/SN	2
45	XTAL301	830028710	1

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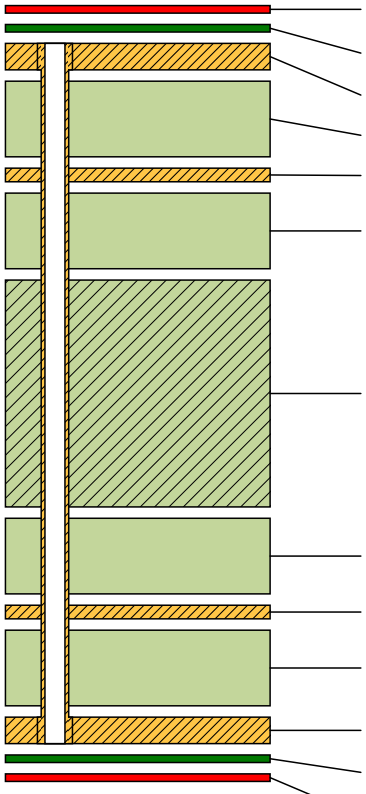
Layer Stack Legend



Material	Layer	Thickness	Dielectric Material	Type	Gerber
	Top Overlay			Legend	GTO
Surface Material	Top Solder	0.01mm	Solder Resist	Solder Mask	GTS
Copper	**Top Layer**	**0.04mm**		**Signal**	**GTL**
Prepreg		*0.10mm*	*PP-006*	*Dielectric*	
CF-004	**GND**	**0.02mm**		**Signal**	**G1**
Prepreg		*0.10mm*	*PP-006*	*Dielectric*	
		1.00mm	*FR-4*	*Dielectric*	
Prepreg		*0.10mm*	*PP-006*	*Dielectric*	
CF-004	**PWR**	**0.02mm**		**Signal**	**G2**
Prepreg		*0.10mm*	*PP-006*	*Dielectric*	
Copper	**Bottom Layer**	**0.04mm**		**Signal**	**GBL**
Surface Material	Bottom Solder	0.01mm	Solder Resist	Solder Mask	GBS
	Bottom Overlay			Legend	GBO

Total thickness: 1.53mm

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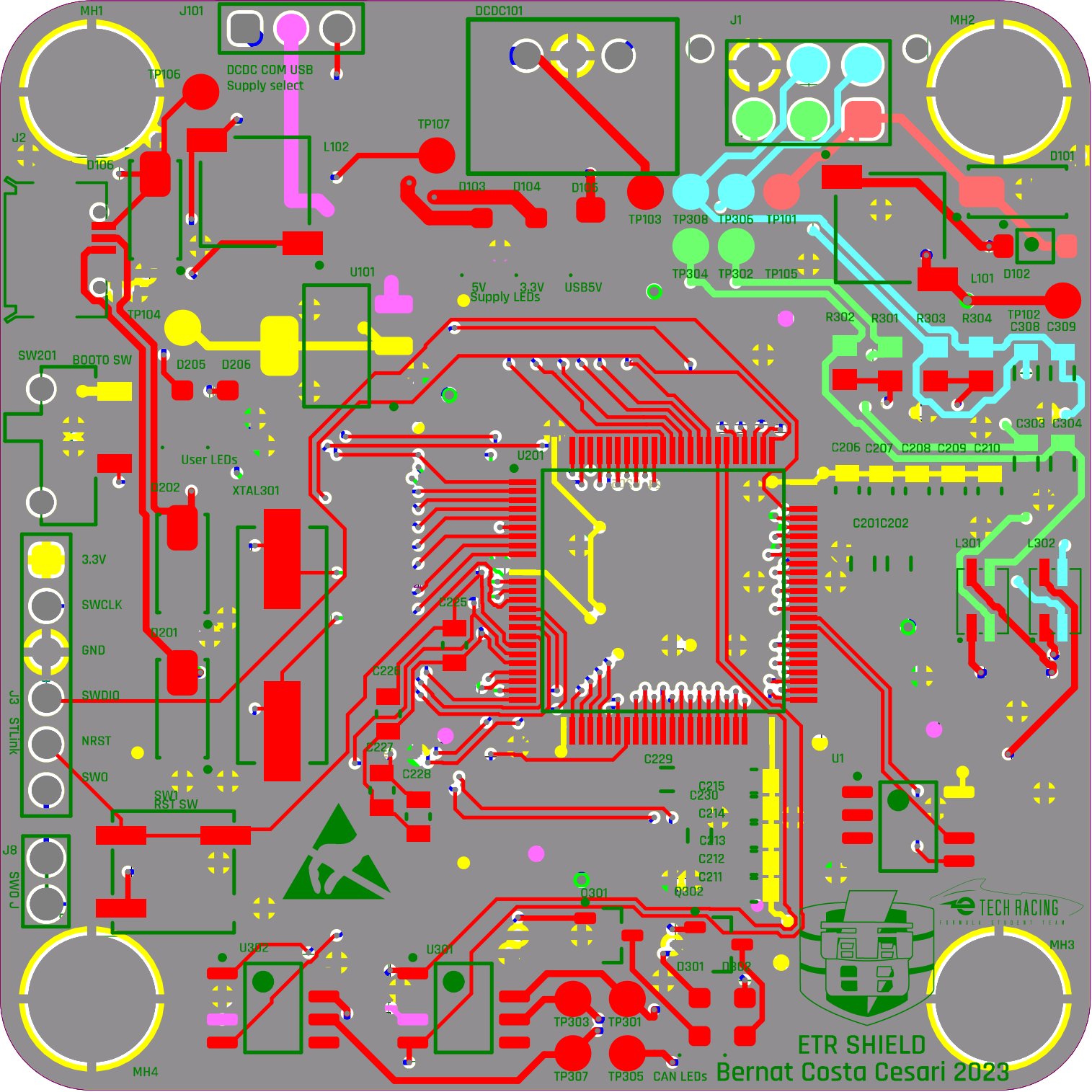
MH1
J101
DCDC COM USB
Supply select
DCDC101
J1
MH2
TP106
TP107
L102
J2
D106
D103
D104
D105
TP103
TP308
TP305
TP101
D101
TP304
TP302
TP105
L101
D102
U101
5V
3.3V
USB5V
Supply LEDs
TP104
R302
R301
R303
R304
TP102
C308
C309
SW201
BOOT0 SW
D205
D206
C303
C304
C205
C207
C208
C209
C210
User LEDs
U201
D202
XTAL301
C201C202
L301
L302
3.3V
SWCLK
GND
SWDIO
NRST
SWO
C225
D201
C226
C227
C228
C229
U1
C215
C230
C214
C213
C212
C211
J3 STLink
SW1
RST SW
J8
SWO J
Q301
Q302
U302
U301
D301
D302
TP303
TP301
TP307
TP305
CAN LEDs
MH3
MH4
TECH RACING
FORMULA STUDENT TEAM
ETR SHIELD
Bernat Costa Cesari 2023