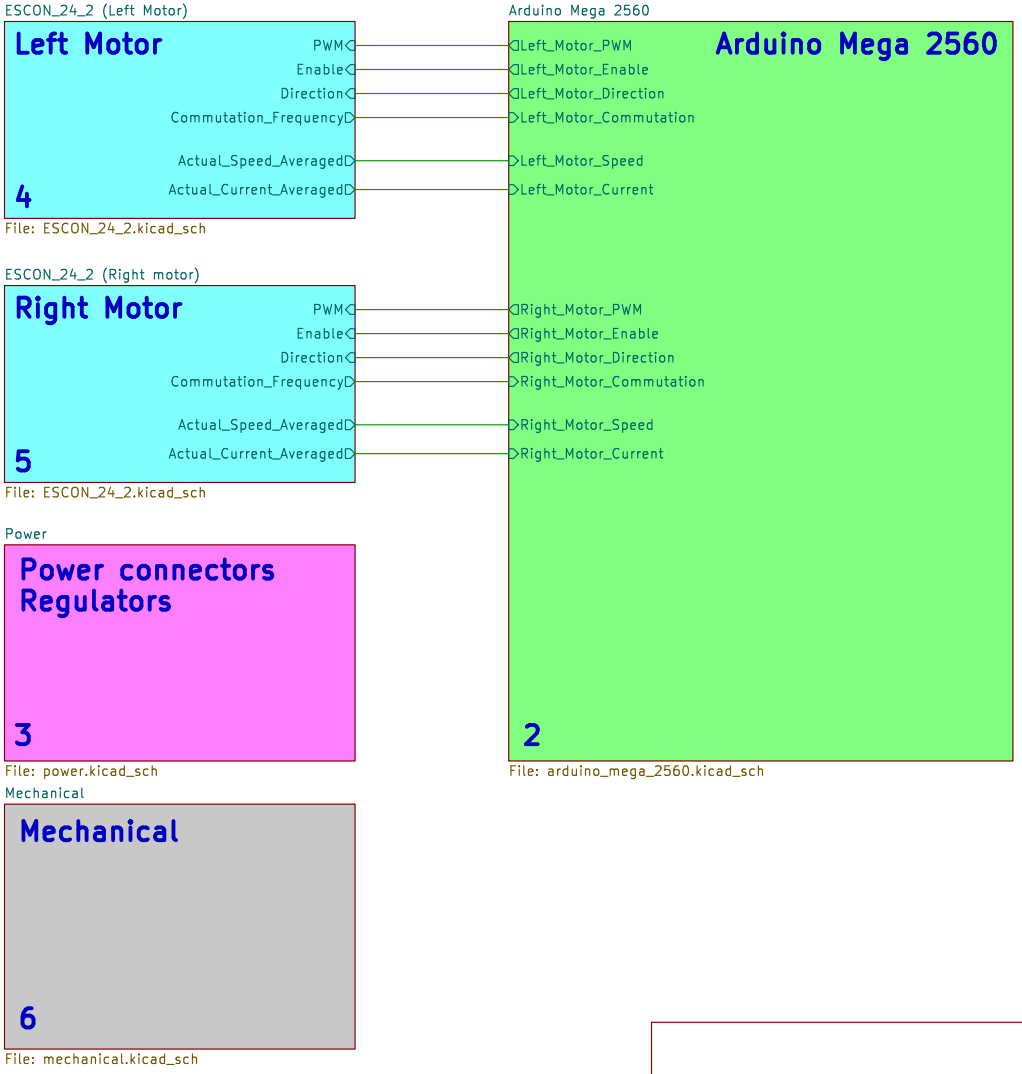
Overview



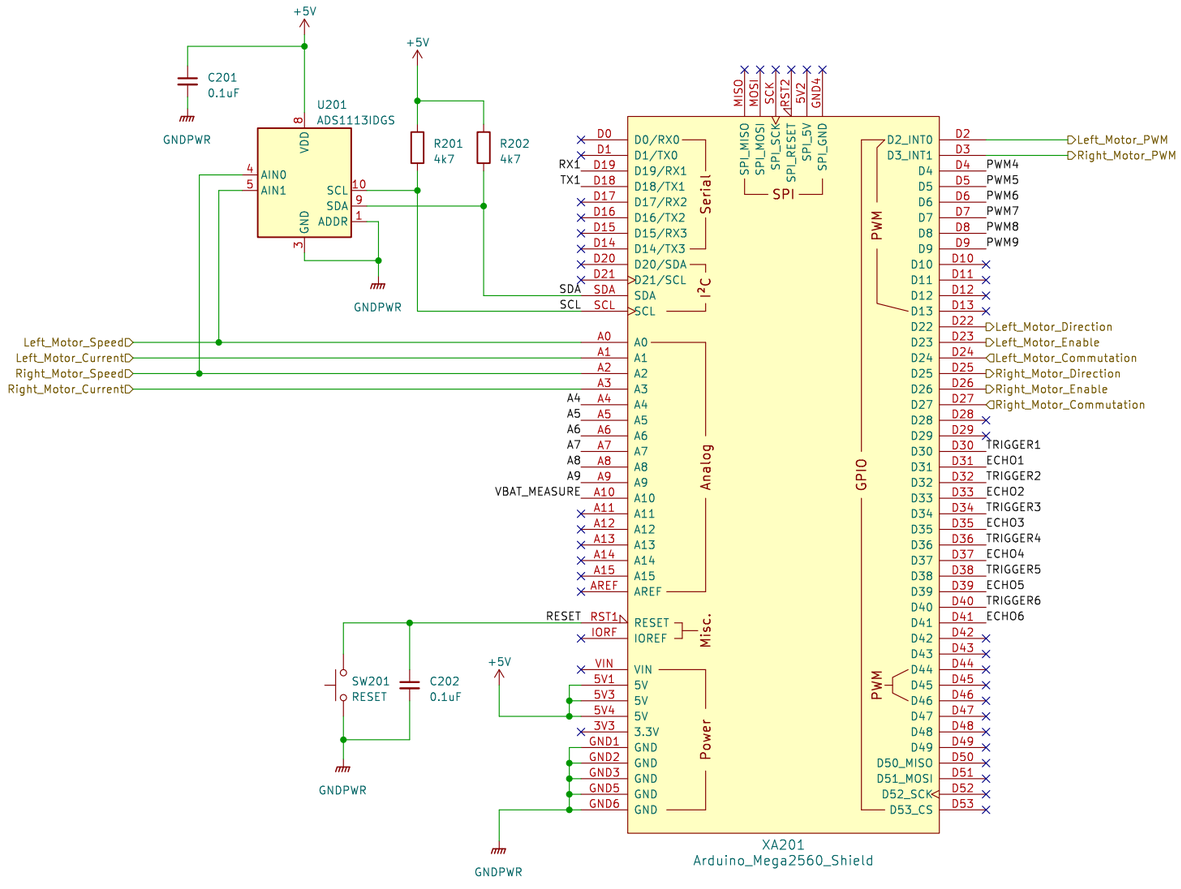
Author: Vincent Nguyen

Team Goombot

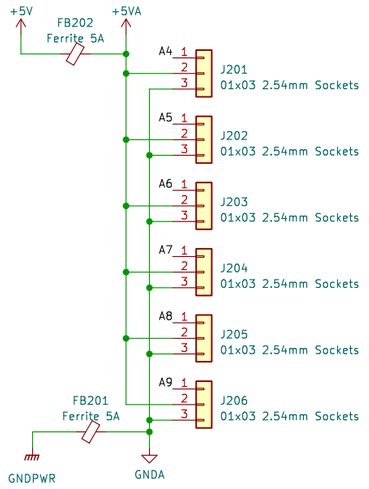
Sheet: /
File: Arduino_motor_shield.kicad_sch

Title: Arduino Mega 2560 ESCON 24/2 MB Shield

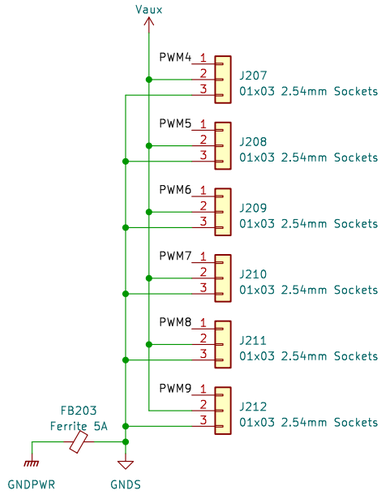
Size: A4	Date: 2023-04-10	**Rev:**
KiCad E.D.A. kicad 7.0.1		Id: 1/6



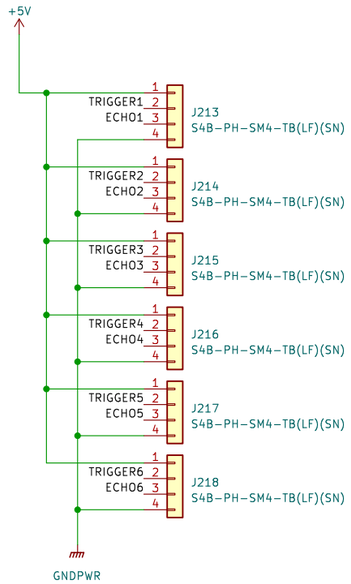
Analog Inputs



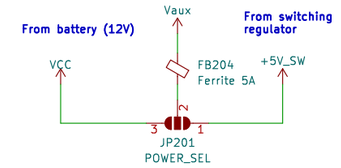
PWM Outputs



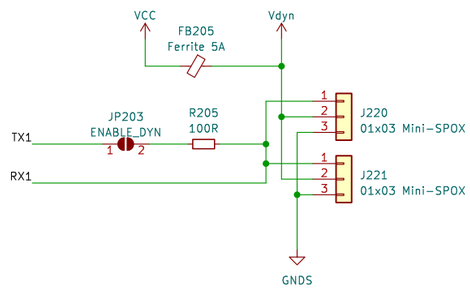
Ultra-sonic sensors connectors



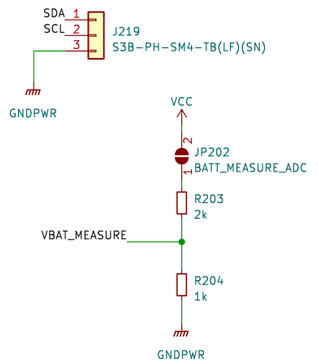
PWM power selection



Dynamixel connector

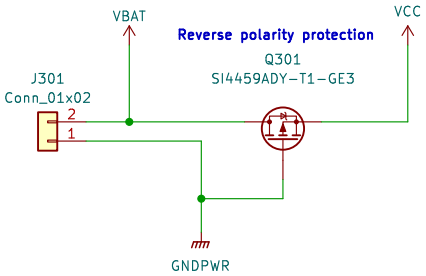


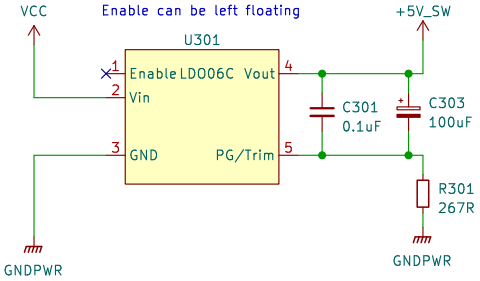
I2C connector (for fuel gauge)



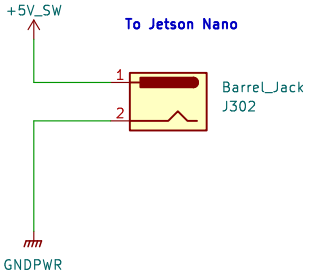
Back to overview

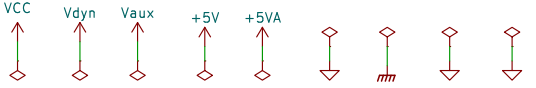
Sheet: /Arduino Mega 2560/		
File: arduino_mega_2560.kicad_sch		
Title:		
Size: A3	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.1		Id: 2/6

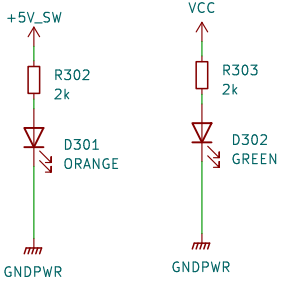




RTrim = 1.182/(5-0.591) = 0.268 kOhm
Closest 1% value: 267 Ohm







Author: Vincent Nguyen

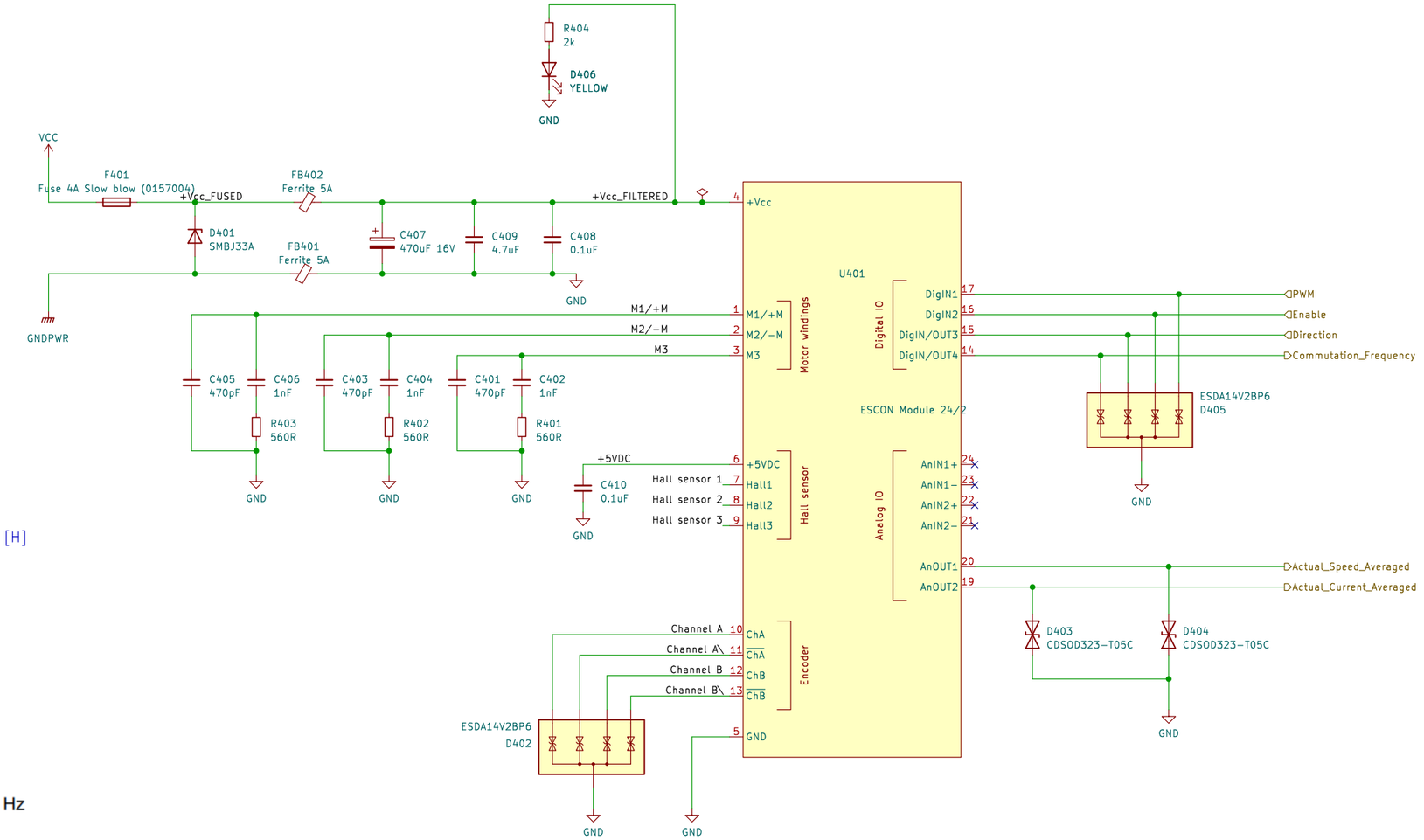
Team Goombot

Back to overview

Sheet: /Power/
File: power.kicad_sch

Title: Power connectors and regulators

Size: A5	Date: 2023-04-10	**Rev:**
KiCad E.D.A. kicad 7.0.1		Id: 3/6



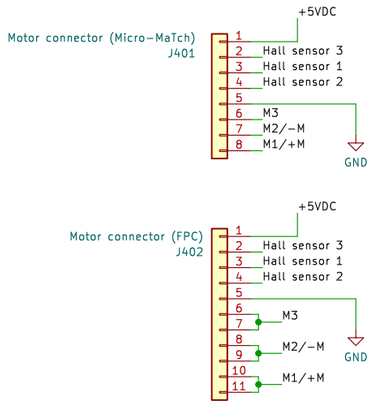
L_phase > 1/2 * (12 / (6*53600*1) − (0.3*1.86*10^(−3))) = −0.00026 [H]
Result is negative, which means that no additional chokes are necessary

$$L_{phase} \geq \frac{1}{2} \cdot \left(\frac{V_{cc}}{6 \cdot f_{PWM} \cdot I_N} - (0.3 \cdot L_{motor}) \right)$$

$L_{phase}[H]$	Additional external inductance per phase
$V_{cc}[V]$	Operating voltage +V_{CC}
$f_{PWM}[Hz]$	Switching frequency of the power stage = 53 600 Hz
$I_N[A]$	Nominal current of the motor (➔line 6 in the maxon catalog)
$L_{motor}[H]$	Terminal inductance of the motor (➔line 11 in the maxon catalog)

EC 32 flat Ø32 mm, brushless, 15 Watt, with Hall sensors

Motor Data					
Values at nominal voltage					
1 Nominal voltage	V	9	12	24	48
2 No load speed	rpm	3720	4610	4530	4780
3 No load current	mA	74.7	75.7	36.9	19.9
4 Nominal speed	rpm	2060	2790	2760	2940
5 Nominal torque (max. continuous torque)	mNm	24.5	25	25.5	24.7
6 Nominal current (max. continuous current)	A	1.06	1	0.5	0.257
7 Stall torque[1]	mNm	68.3	82.3	85.3	83.9
8 Stall current	A	3.06	3.42	1.74	0.904
9 Max. efficiency	%	71	73	73	73
Characteristics					
10 Terminal resistance phase to phase	Ω	2.95	3.51	13.8	53.1
11 Terminal inductance phase to phase	mH	1.61	1.86	7.72	27.7
12 Torque constant	mNm/A	22.4	24.1	49	92.8
13 Speed constant	rpm/V	427	397	195	103
14 Speed/torque gradient	rpm/mNm	56.3	57.8	54.8	58.8
15 Mechanical time constant	ms	20.6	21.2	20.1	21.6
16 Rotor inertia	gcm²	35	35	35	35



Datasheet

Author: Vincent Nguyen

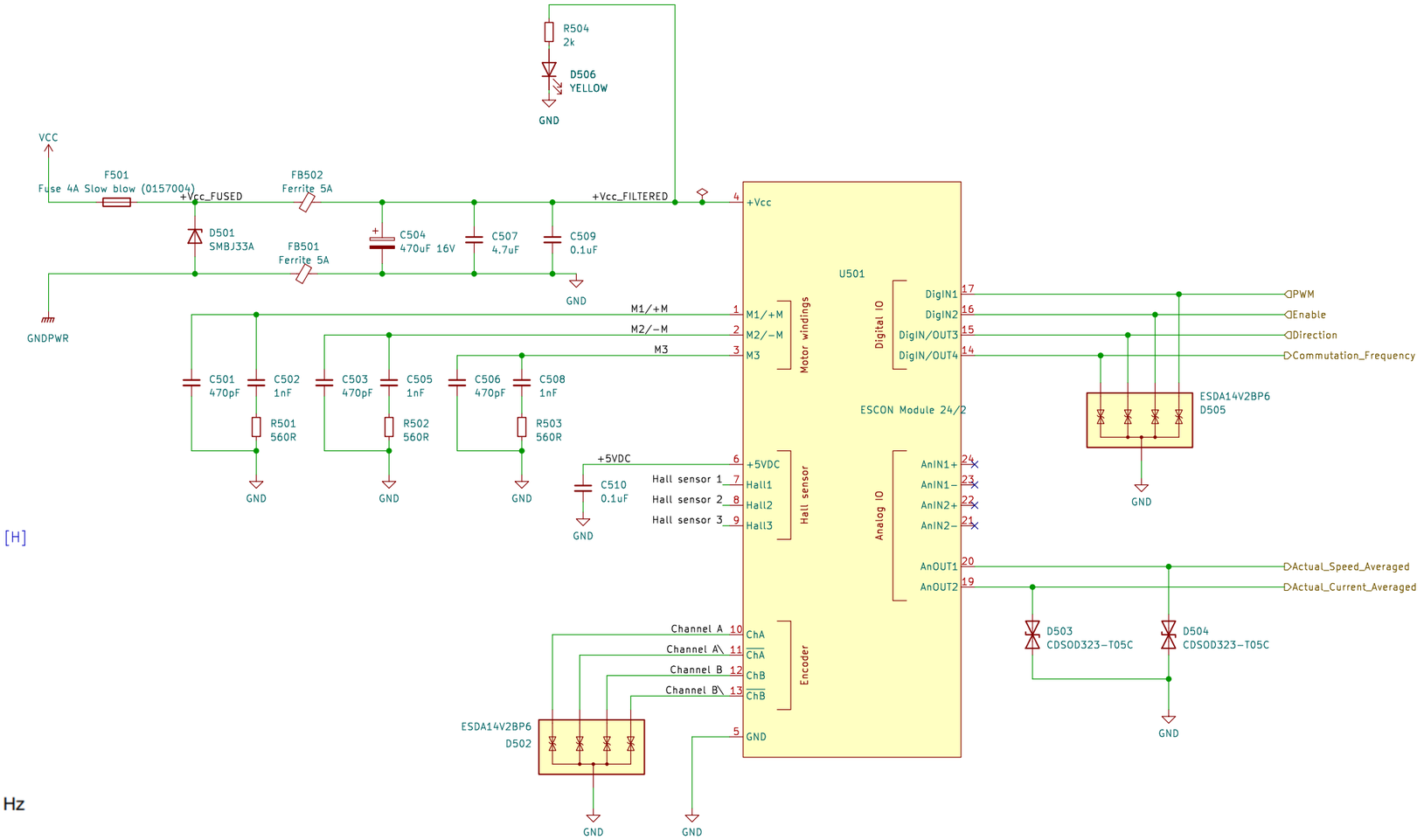
Team Goombot

Back to overview

Sheet: /ESCON_24_2 (Left Motor)/
File: ESCON_24_2.kicad_sch

Title: ESCON 24/2 Interface

Size: A3	Date: 2023−04−10	Rev:
KiCad E.D.A. kicad 7.0.1		Id: 4/6



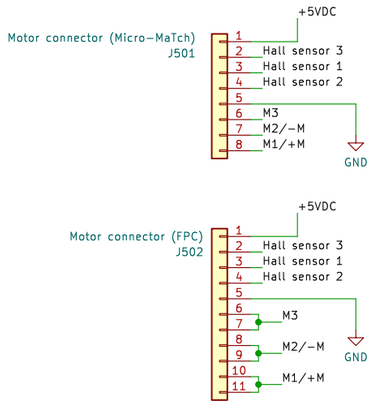
$L\_phase > 1/2 * (12 / (6*53600*1) - (0.3*1.86*10^(-3))) = -0.00026$ [H]
Result is negative, which means that no additional chokes are necessary

$$L_{phase} \geq \frac{1}{2} \cdot \left(\frac{V_{cc}}{6 \cdot f_{PWM} \cdot I_N} - (0.3 \cdot L_{motor}) \right)$$

$L_{phase}[H]$	Additional external inductance per phase
$V_{cc}[V]$	Operating voltage $+V_{CC}$
$f_{PWM}[Hz]$	Switching frequency of the power stage = 53 600 Hz
$I_N[A]$	Nominal current of the motor (➔line 6 in the maxon catalog)
$L_{motor}[H]$	Terminal inductance of the motor (➔line 11 in the maxon catalog)

EC 32 flat Ø32 mm, brushless, 15 Watt, with Hall sensors

Motor Data					
Values at nominal voltage					
1 Nominal voltage	V	9	12	24	48
2 No load speed	rpm	3720	4610	4530	4780
3 No load current	mA	74.7	75.7	36.9	19.9
4 Nominal speed	rpm	2060	2790	2760	2940
5 Nominal torque (max. continuous torque)	mNm	24.5	25	25.5	24.7
6 Nominal current (max. continuous current)	A	1.06	1	0.5	0.257
7 Stall torque[1]	mNm	68.3	82.3	85.3	83.9
8 Stall current	A	3.06	3.42	1.74	0.904
9 Max. efficiency	%	71	73	73	73
Characteristics					
10 Terminal resistance phase to phase	Ω	2.95	3.51	13.8	53.1
11 Terminal inductance phase to phase	mH	1.61	1.86	7.72	27.7
12 Torque constant	mNm/A	22.4	24.1	49	92.8
13 Speed constant	rpm/V	427	397	195	103
14 Speed/torque gradient	rpm/mNm	56.3	57.8	54.8	58.8
15 Mechanical time constant	ms	20.6	21.2	20.1	21.6
16 Rotor inertia	gcm²	35	35	35	35



Datasheet

Author: Vincent Nguyen

Team Goombot

Back to overview

Sheet: /ESCON_24_2 (Right motor)/
File: ESCON_24_2.kicad_sch

Title: ESCON 24/2 Interface

Size: A3	Date: 2023-04-10	**Rev:**
KiCad E.D.A. kicad 7.0.1		Id: 5/6

Back to overview

Sheet: /Mechanical/
File: mechanical.kicad_sch

Title:

Size: A5	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.1		Id: 6/6