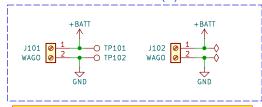
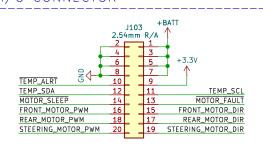
BATTERY CONNECTOR(s)

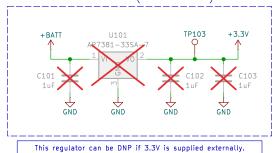


REPLACE WITH HIGH CURRENT RATED PART?

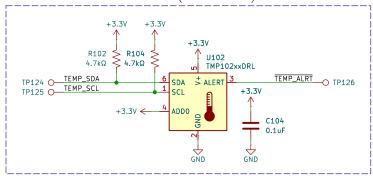
I/O CONNECTOR



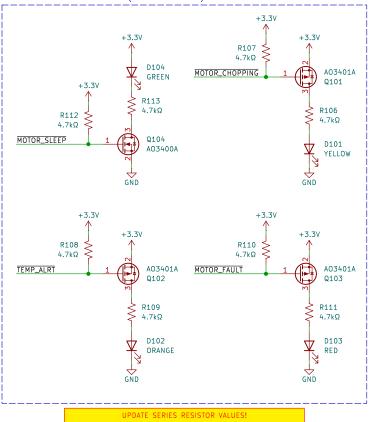
3.3V REGULATOR (OPTIONAL)



TEMPERATURE SENSOR (OPTIONAL)



LED INDICATORS (OPTIONAL)



MOUNTING HOLES

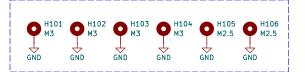
MOTOR_SLEEP

TP110 O REAR_MOTOR_DIR
TP111 O REAR_MOTOR_PWM
MOTOR_CHOPPING

TP112 O REAR_MOTOR_CSA_OU MOTOR_FAULT

MOTOR_SLEEP

TP113 STEERING_MOTOR_DIR
TP114 STEERING_MOTOR_PWM
MOTOR_CHOPPING



DC Motor Controller - Front Wheels

DC Moto<u>r Controller — Rear Wheels</u>

MOTOR_OUT_AD

MOTOR_OUT_BD

MOTOR_OUT_AD

MOTOR_OUT_BD

SLEEP

CHOPPING

File: DRV8701.kicad_sch

File: DRV8701.kicad_sch

File: DRV8701.kicad_sch

DC Motor Controller - Steering

CSA_OUT

FAULT

SLEEP

⊃PWM

CHOPPING

CSA OUT

FAULT

SLEEP

>PWM

CSA_OUT

TAULT



FIDUCIALS

MOTOR

OUTPUTS

1 S J104 WAGO

1 S J105 WAGO

1 S J106 WAGO

TP116

O TP117

O TP119

TP120 Q

STEERING_MOTOR_OUT_A

FRONT_MOTOR_OUT_A

MOTOR_OUT_AD REAR_MOTOR_OUT_A REAR_MOTOR_OUT_B

Geeks for Kids

Learn Science and Math Club

Sheet: /
File: motor-controller-v3.kicad_sch

Title: Brushed DC Motor Driver

 Size: USLedger
 Date: 2025-10-21
 Rev: V3

 KiCad E.D.A. 9.0.5
 Id: 1/4

DC MOTOR CONTROLLER

IC Notes:

The DRV8701 is a single H-bridge gate driver that uses four external N-channel MOSFETs targeted to drive a 12-V to 24-V bidirectional brushed DC motor.

VBAT Voltage Range: 6V to 45V (abs. max)
Motor Drive Current: up to 35 A continuous
Inputs compatible with 1.8, 3.3, and 5 V logic
PWM operation up to 100 kHz
CSA output prop. to motor current (20 mV/A)
Active current chopping at 50 A
Undervoltage shutdown
Short circuit protection

DRV8701 Datasheet

MOT6142G Datasheet

Bulk Capacitor Sizing for DC Motor Drivers

DESIGN NOTES

FET: MOT6142G (Qgd = 6.8 nC typ.)

FET Gate Rise Time $t_R = Q_{gd}/IDRIVE$

To achieve 100ns < tR < 300ns, 22.7mA < IDRIVE < 68mA.

Connecting a $200k\Omega$ resistor from IDRIVE pin to GND yields IDRIVE = 25mA.

Choosing Rsense = 1m0hm

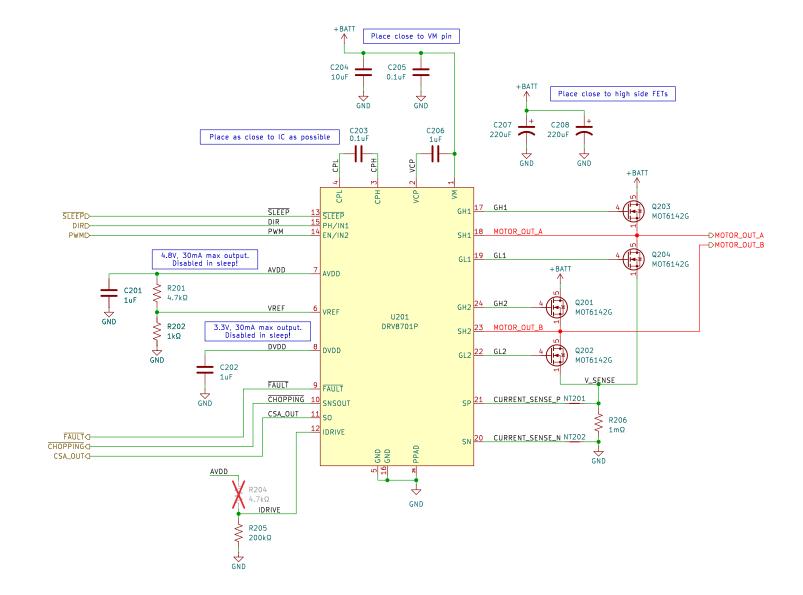
ICHOP = (VREF-VOFFSET)/(AV*RSENSE)

For ICHOP = 40A, VREF must be set to 0.85V. Use Ru = 4.7k, Rp = 1.0k (0.842V typ.)

Note: fpwm < lycp / 2*QgD. Do not allow fpwm to exceed 400kHz!

DRV8701P (PWM) CONTROL INTERFACE

SLEEP	IN1	IN2	Description
0	Х	Х	Sleep; H-Bridge Disabled, High-Z
1	0	0	Coast; H-Bridge Disabled, High-Z
1	0	1	Reverse; Current SH2 -> SH1
1	1	0	Forward; Current SH1 -> SH2
- 4	1	- 1	Braker Low Side Slow Decay



Geeks for Kids Learn Science and Math Club Sheet: /DC Motor Controller - Front Wheels/ File: DRV8701.kicad_sch Title: Brushed DC Motor Driver Size: USLedger Date: 2025-10-21 KiCad E.D.A. 9.0.5 Rev: V3

ld: 2/4

DC MOTOR CONTROLLER

IC Notes:

The DRV8701 is a single H-bridge gate driver that uses four external N-channel MOSFETs targeted to drive a 12-V to 24-V bidirectional brushed DC motor.

VBAT Voltage Range: 6V to 45V (abs. max)
Motor Drive Current: up to 35 A continuous
Inputs compatible with 1.8, 3.3, and 5 V logic
PWM operation up to 100 kHz
CSA output prop. to motor current (20 mV/A)
Active current chopping at 50 A
Undervoltage shutdown
Short circuit protection

DRV8701 Datasheet

MOT6142G Datasheet

Bulk Capacitor Sizing for DC Motor Drivers

DESIGN NOTES

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Connecting a $200k\Omega$ resistor from IDRIVE pin to GND yields IDRIVE = 25mA.

Choosing Rsense = 1m0hm

ICHOP = (VREF-VOFFSET)/(AV*RSENSE)

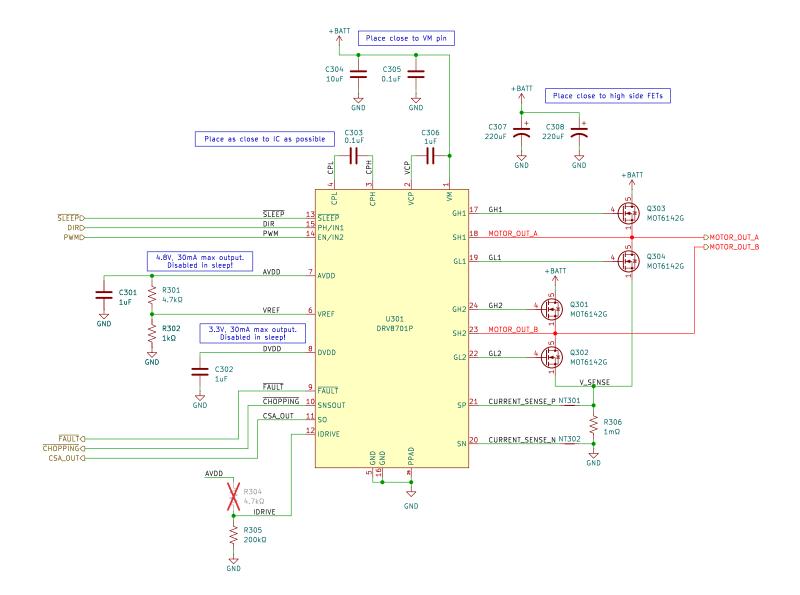
For ICHOP = 40A, VREF must be set to 0.85V. Use Ru = 4.7k, Rp = 1.0k (0.842V typ.)

VCSA_OUT = RSENSE*AV*I + VOFFSE

Note: fpwm < lycp / 2*QgD. Do not allow fpwm to exceed 400kHz!

DRV8701P (PWM) CONTROL INTERFACE

SLEEP	IN1	IN2	Description
0	Х	Х	Sleep; H—Bridge Disabled, High—Z
1	0	0	Coast; H-Bridge Disabled, High-Z
1	0	1	Reverse; Current SH2 -> SH1
1	1	0	Forward; Current SH1 -> SH2
- 1	- 4	- 4	Dealer Laur Cida Claur Dagan



Geeks for Kids

Learn Science and Math Club

Sheet: /DC Motor Controller - Rear Wheels/
File: DRV8701.kicad_sch

Title: Brushed DC Motor Driver

Size: USLedger | Date: 2025-10-21 | Rev: V3

KiCad E.D.A. 9.0.5 | Id: 3/4

DC MOTOR CONTROLLER

IC Notes:

The DRV8701 is a single H-bridge gate driver that uses four external N-channel MOSFETs targeted to drive a 12-V to 24-V bidirectional brushed DC motor.

VBAT Voltage Range: 6V to 45V (abs. max)
Motor Drive Current: up to 35 A continuous
Inputs compatible with 1.8, 3.3, and 5 V logic
PWM operation up to 100 kHz
CSA output prop. to motor current (20 mV/A)
Active current chopping at 50 A
Undervoltage shutdown
Short circuit protection

DRV8701 Datasheet

MOT6142G Datasheet

Bulk Capacitor Sizing for DC Motor Drivers

DESIGN NOTES

FET: MOT6142G (Qgd = 6.8 nC typ.)

FET Gate Rise Time tR = Qgd/IDRIVE

To achieve 100ns < tr < 300ns, 22.7mA < IDRIVE < 68mA.

Connecting a $200k\Omega$ resistor from IDRIVE pin to GND yields IDRIVE = 25mA.

Choosing Rsense = 1m0hm

ICHOP = (VREF-VOFFSET)/(AV*RSENSE)

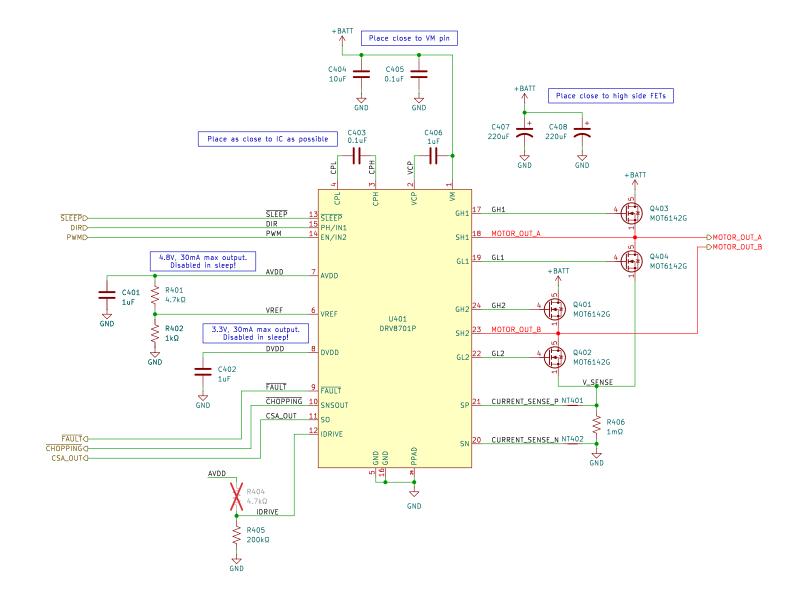
For ICHOP = 40A, VREF must be set to 0.85V. Use Ru = 4.7k, Rp = 1.0k (0.842V typ.)

CSA_OUT = RSENSE*Av*I + VOFFSET

Note: fpwm < lycp / 2*QgD. Do not allow fpwm to exceed 400kHz!

DRV8701P (PWM) CONTROL INTERFACE

District (First) Continued internation					
SLEEP	IN1	IN2	Description		
0	X	Х	Sleep; H-Bridge Disabled, High-Z		
1	0	0	Coast; H—Bridge Disabled, High—Z		
1	0	1	Reverse; Current SH2 -> SH1		
1	1	0	Forward; Current SH1 -> SH2		
1	1	1	Brake; Low-Side Slow Decay		



Geeks for Kids

Learn Science and Math Club

Sheet: /DC Motor Controller - Steering/
File: DRV8701.kicad_sch

Title: Brushed DC Motor Driver

Size: USLedger | Date: 2025-10-21 | Rev: V3

KiCad E.D.A. 9.0.5 | Id: 4/4