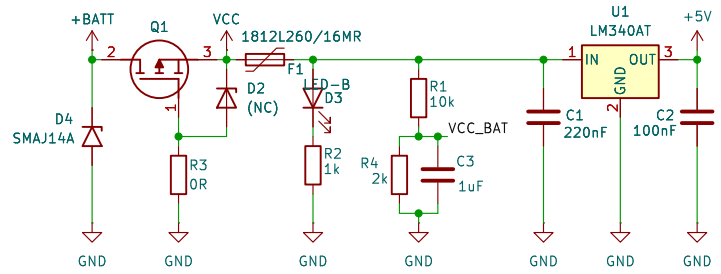
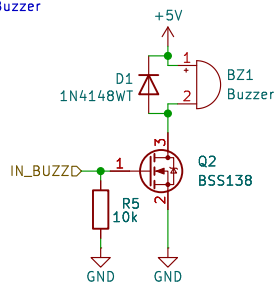
Voltage acquisition, regulator, ESD, reverse polarity and current protection



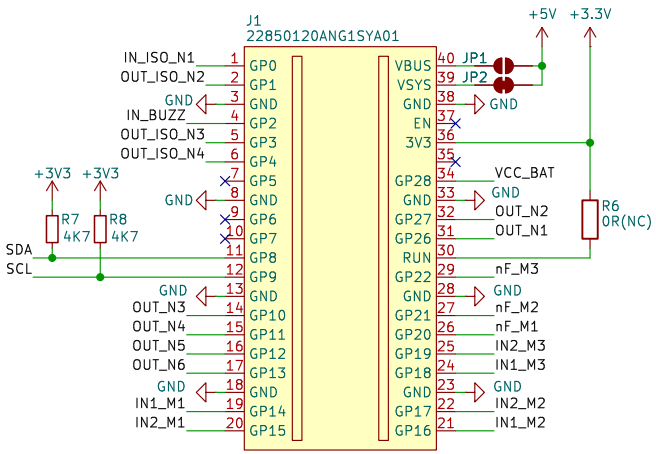
Protection function with MOSFET P SQD50P04-13L_T4GE3, TVS diode, resettable fuse, and voltage regulation. This circuit provides reverse polarity, ESD, and overcurrent protection, followed by voltage regulation to 5V.
- Q3 (P-MOSFET): Blocks reverse polarity :
- D2 (TVS 5MJ14A): Protects against voltage transients.
- F1 (Polyfuse): Limits overcurrent.
- U1 (LM340AT): Regulates voltage to 5V.
- LED D1: Indicates power status.

Driver Buzzer



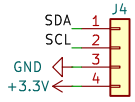
Buzzer driver with N-MOSFET BSS138 and flyback diode
This circuit allows driving a buzzer (BZ1) using a logic signal (IN_BUZZ).
- Q2 (BSS138): Acts as a switch, turning the buzzer on when IN_BUZZ is high.
- R8 (10kΩ): Pull-down resistor ensuring Q2 turns off when IN_BUZZ is low.
- D3 (1N4148WT): Flyback diode protecting against voltage spikes.

RP2040 USB-C 128MB

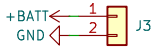


RP2040 USB-C Interface & GPIO Expansion
- Power: USB-C supplies +5V and +3.3V, with JP1/JP2 for power selection.
- I²C Bus: SDA/SCL pulled up to 3.3V via 4.7kΩ resistors for stable communication.
- GPIO & Isolation: Mapped IN/OUT signals, including isolated I/O for protection.
Buzzer Control: IN_BUZZ manages an external buzzer driver.

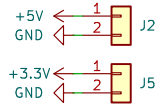
I²C Connector
B4B-XH-A

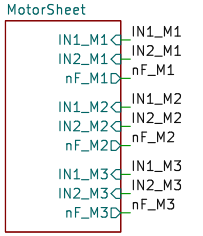


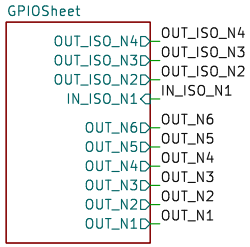
Power IN Connector
B2B-XH-A



Power OUT Connector
B2B-XH-A







Avionic Sheet
Voltage Protection and Regulation:
- **P-MOSFET (SQD50P04-13L_T4GE3): Prevents reverse polarity.**
- **TVS diode (5MJ14A): Protects against voltage transients.**
- **Polyfuse: Limits overcurrent.**
- **LM340AT Regulator: Converts battery voltage to 5V for system operation.**

RP2040 Microcontroller:
- **Handles GPIO, I²C, and peripheral control.**
- **USB-C connectivity with 12MB storage for data processing.**

Buzzer Driver:
- **N-MOSFET (BSS138) acts as a switch for buzzer activation.**
- **Flyback diode (1N4148WT) protects against voltage spikes.**

Peripheral Connectors:
- **I²C, power input, and power output headers for external device integration.**
- **Motor and GPIO sheets linked for extended functionality.**

BerryRocket

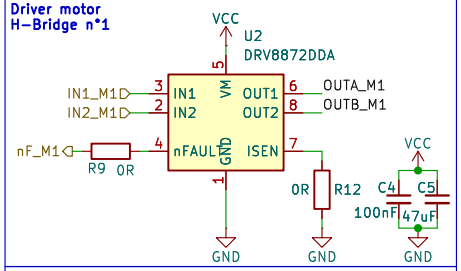
Sheet: /
File: BR-Motor.kicad_sch

Title: BR-MOTOR : MAIN Sheet

Size: A4	Date: 2025-02-23	Author : Paul Miailhe	**Rev: V°1**
KiCad E.D.A. 8.0.5			Id: 1/3

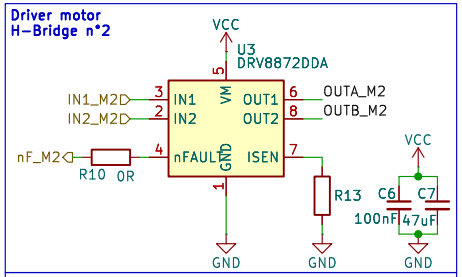
Text

Driver motor H-Bridge n°1



DRV8872 3.6-A Brushed DC Motor Driver With Fault Reporting (PWM Control) :
- Extended operating voltage from 6.5 V to 45 V
- 3.6 A Peak current
- PWM control interface
- Integrated current regulation
- Low-power standby mode
- Fault status output pin
- Integrated protection features : UVLO, OCP, TSD
- Automatic fault recovery

Driver motor H-Bridge n°2



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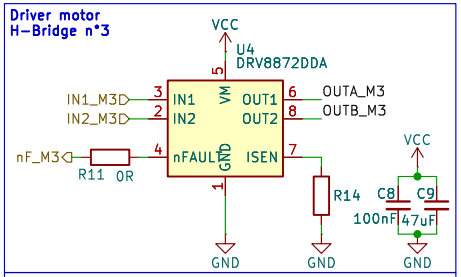
Driver motor H-Bridge n°3



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- 3.6 A Peak current
- PWM control interface
- Integrated current regulation
- Low-power standby mode
- Fault status output pin
- Integrated protection features : UVLO, OCP, TSD
- Automatic fault recovery

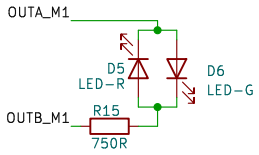
Motor Driver System – Brushed DC Motor Control (Motor 1, Motor 2, and Motor 3)

DRV8872 Motor Driver:
– Supports currents up to 3.6A with a wide voltage range (6.5V to 45V).
– Integrated protection features: undervoltage lockout (UVLO), overcurrent protection (OCP), and thermal shutdown (TSD).
– Fault status output and automatic fault recovery.
–Operates in standby mode and PWM control mode for motor speed and direction control.

Motor Direction LED Indicators (Motor 1, Motor 2, and Motor 3):
– LED circuits provide visual feedback on motor direction.
– Eliminates the need to connect a motor for testing.
– Simple, efficient debugging method for motor control logic.

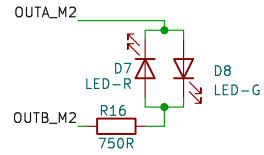
Connector Interfaces:
– Dedicated output connectors for Motor 1, Motor 2, and Motor 3.

Motor direction LED motor n°1



- Allows you to see the rotation of the DC motor
- Avoiding the need to connect the motor for testing.

Motor direction LED motor n°2



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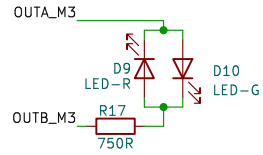
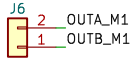
Motor direction LED motor n°3

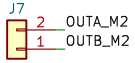


- Allows you to see the rotation of the DC motor
- Avoiding the need to connect the motor for testing.

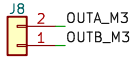
Connector motor n°1
B2B-XH-A



Connector motor n°2
B2B-XH-A



Connector motor n°3
B2B-XH-A



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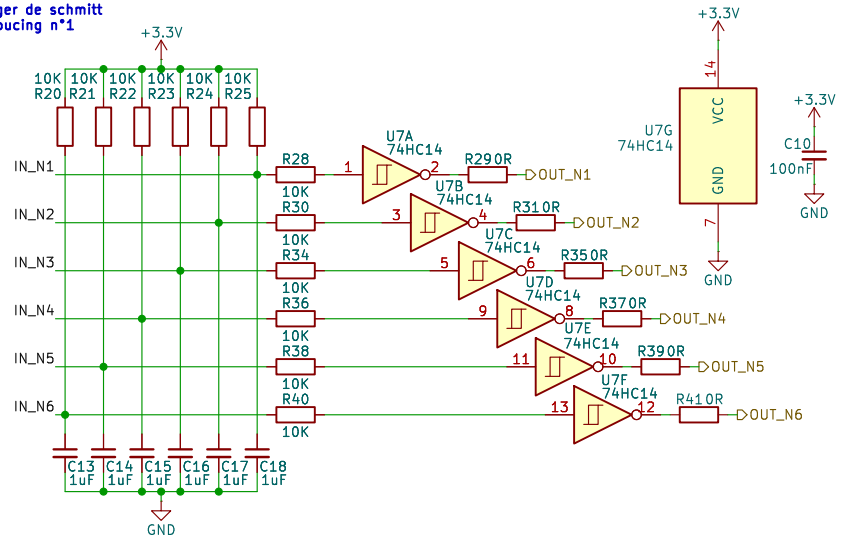
Sheet: /MotorSheet/
File: MotorSheet.kicad_sch

Title: BR-MOTOR : MOTOR Sheet

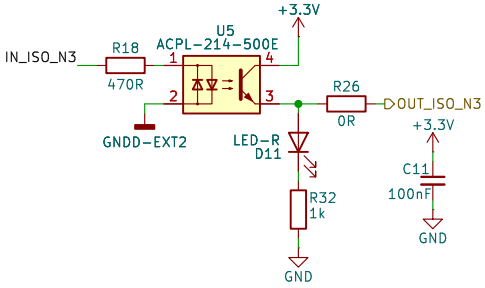
Size: A4	Date: 2025-02-23	Author : Paul Miailhe	Rev: V°1
KiCad E.D.A. 8.0.5			Id: 2/3

Trigger de schmitt Debouncing n°1



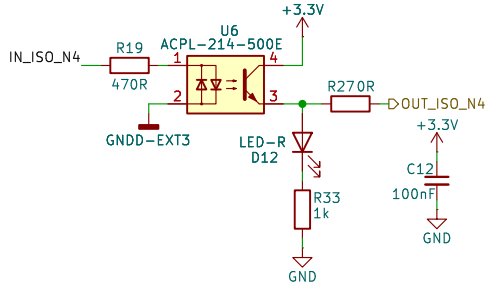
Hex Schmitt−Trigger Inverter High−Performance Silicon−Gate CMOS :
- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance With the JEDEC Standard No. 7A Requirements
- ESD Performance: HBM 2000 V; Machine Model 200 V
- Chip Complexity: 60 FETs or 15 Equivalent Gates
- These are Pb−Free Devices

Octocoupler IN n°1



ACPL-214 AC / TLP292(TPL,E Input, Half-Pitch Phototransistor Optocoupler Data Sheet
- Current transfer ratio (CTR: min. 20% at IF = ±5mA, VCC = 5V)
- High input-output isolation voltage (VISO = 3,000VRMS)
- Non-saturated Response time (tr: typ. 2µs at VCC = 10V, IC = 2mA, RL= 100Ω)
- CMR 10 kV/µs (typical)

Octocoupler IN n°2



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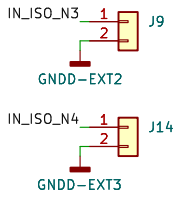
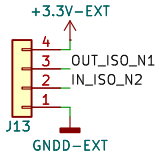
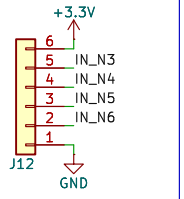
Opto Connector B2B−XH−A



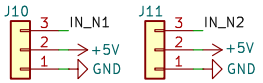
UART Connector B4B−XH−A



SPI Connector B6B−XH−A



PWM Connector B3B−XH−A



GPIO Signal Processing and Isolation System
Schmitt Trigger Buffer:
- Uses high−performance CMOS buffers to clean up noisy digital signals.
- Ensures proper signal integrity for further processing.

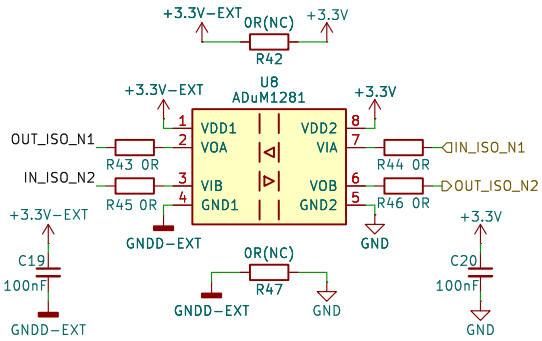
Optocoupler Isolation (IN#1 & IN#2):
- AC/DC−input optocouplers provide galvanic isolation for external signals.
- High common−mode rejection and fast response for reliable operation.

Level Shifter and Isolation:
- Converts logic levels (e.g., 3.3V to 5V) for safe interfacing.
- Isolates external and internal circuits to prevent ground loops.

Bridge Circuit:
- Routes multiple input signals to designated outputs for flexible signal mapping.

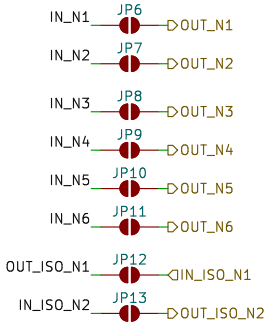
Communication Connectors:
- UART, SPI, PWM, and GPIO headers facilitate interfacing with external devices.
- Properly voltage−matched for 3.3V and 5V systems.

Data converter isolator n°1



3kV rms, Default High, Dual-Channel Digital Isolators (1/1 Channel Directionality)
- Up to 100 Mbps data rate (NRZ)
- Low propagation delay: 23 ns typical
- Low dynamic power consumption
- Bidirectional communication
- 3.3 V to 5 V level translation
- High temperature operation: 125°C
- High common-mode transient immunity: >25 kV/µs

Bridge n°1



Jumper to activate functionalities: one input or one output to prevent asset conflicts.

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Sheet: /GPIOSheet/
File: GPIOSheet.kicad_sch

Title: BR−MOTOR : GPIO Sheet

Size: A4	Date: 2025−02−23	Author : Paul Miailhe	**Rev: V°1**
KiCad E.D.A. 8.0.5			Id: 3/3