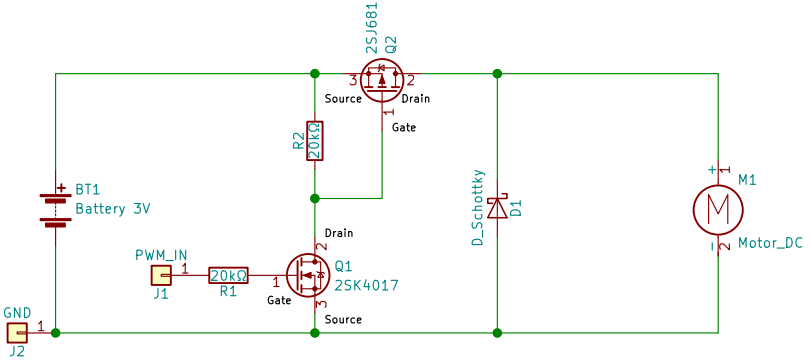
* Connect PWM_IN (J1) with GPIO 12 or 13 of Raspberry Pi (RasPi).
  RasPi's GPIO pins are driven with 3.3 volts. Don't apply 5 volts to PWM_IN (J1).
* Connect GND (J2) with any ground pin of RasPi.
* Q1 is a N-channel power MOSFET (enhancement mode). I used 2SK4017.
* Q2 is a P-channel power MOSFET (enhancement mode). I used 2SJ681.
  By using two stages switching, Q2 can drive more drain current than one stage switching only by Q1.
  RasPi's output signals are 3.3 volts. This voltage may not be enough to drive a MOSFET you apply.
  Caution that R2 needs to have its enough maximum power rating.
  For example, if you use 3.0 volts battery, R2 consumes power as follows.
  Pr2 = (3 - <voltage drop on drain to source of Q1>)^2 / 20000
  If the voltage drop of Q1 is close to zero, it is 0.00045 watts.
* In this schematic, DC motor's (M1) voltage range should be 1.5 volts to 3.0 volts,
  and the normal voltage should be 3.0 volts.
  M1 is driven with 3.0 volts battery (2 of AA cells in series).
* M1 has enough inductance to make a low-pass filter,
  so you don't need another coil in series and a capacitor in parallel.
* Schottky diode's (D1) maximum average forward rectified current
  needs enough value compared to current consumption of a DC motor.
  For example, current consumption of a DC motor is 650 milliamperes,
  and a schottky diode you apply needs 650 milliamperes tolerance for its forward current.
  So the value, 1 ampere, is suitable as the diode's maximum average forward rectified current.

* Battery should be considered of battery's output impedance.
  For example, if a AA cell has 0.1 ohms of its output impedance
  and current consumption of the AA cells is 650 milliamperes,
  voltage drop in the AA cells is calculated as follows.
  2 * 0.1 * 650 milliamperes = 0.13 volts
  In addition, current consumption on the two stages switching
  should be considered.
  3 / (2 * 0.1) + 20000 = 0.15 milliamperes
  2 * 0.1 * 0.15 milliamperes = 0.00003 volts
  These values should be subtracted in the calculation.



The values of R1 and R2 consider capacitance between gate and source of Q1 and Q2.
High resistances of R1 and R2 reduce maximum pulse repetition frequencies of Q1 and Q2 (Imagine a RC oscillator).

JimmyKenMerchant

Sheet: /
File: dc_motor_driver2.sch

Title: DC Motor Driver with Buck (Step-down) Converter Type 2

Size: A4	Date: 2019-01-24	**Rev: 1.0.0**
KiCad E.D.A. kicad 4.0.7		Id: 1/1