


MOSFET

O-POWER

Required knowledge Ohm's Law, Mosfet principle

	<p>Mosfet – how mosfets work – N-Channel mosfet – Enhancement mosfet</p>
---	---



For the switching of larger DC currents with a microcontroller you have the choice between a Relay, a Darlington transistor or a Mosfet. In most cases a mosfet will be the most obvious choice because mosfets are faster and can switch more current, but mainly because they do not draw any current from the uC-pin. Mosfets can switch quite fast and that makes it possible to use PWM signals to control the power with a mosfet.



Be Aware: the power circuit of the mosfet can be any DC voltage that is allowed by the specific mosfet. Be careful and be aware that voltages over 50V can be very dangerous and should be handled with the proper knowledge.

<p>MOSFET</p>	<p>RFP12N10L – 12A, 100Volt – 5Volt Ugs_on Farnell: 1017795</p> <p>RFP50N06 – 50A, 60Volt – 10Volt Ugs_on Farnell: 9845771</p> <p>or Mosfet of your own choice</p>
---------------	--

Mosfets that can operate with a Ugs_on voltage of 5V are called logic fets and they can be connected directly to any IO pin of the Brainbox. This makes that Logic fets are the most obvious choice. Mosfets do not draw any mentionable current from the microcontroller IO pins.

The 4 power outputs from the L293D IC can also be used to drive mosfets. You need to use these 4 outputs to drive mosfets with higher Ugs_on voltages by setting the jumper correctly.

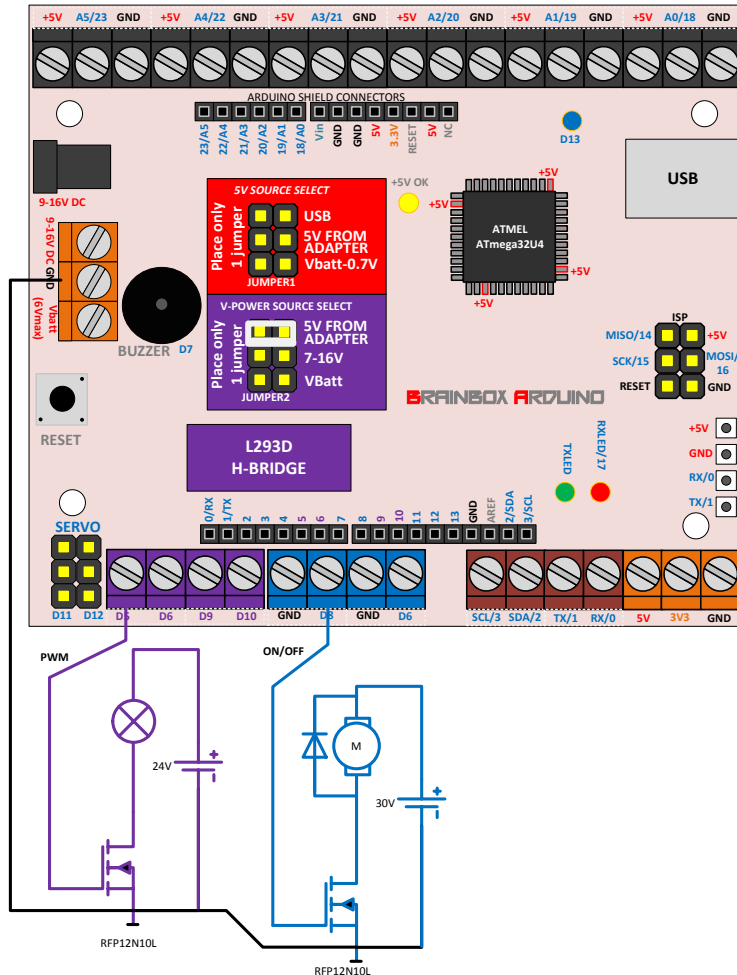
- Ugs_on = 5V (Logic Fet) -> 'V power source select'-jumper at '5V from adapter'
- Ugs_on = 10V -> 'V power source select'-jumper at '7-16V' – Adapter set at 12V



Connect all the GND's. Be aware that mosfets are very sensitive for Ugs voltages that exceed the maximum stated in the datasheet. Forgetting to connect the GND of the mosfet power circuit to the GND of the Brainbox will in most cases immediately destroy the mosfet because the floating voltage at the gate at that time will exceed the maximum Ugs.



PWM frequency. The temperature of mosfets is very dependent of the switching frequency. The higher the frequency, the more the mosfet temperature will rise. Choose your PWM frequency as low as possible (50Hz for light, 1KHz for DC motors)



The left mosfet is connected to pin D5 of the H-bridge. This pin can generate PWM signals to regulate the output power of the mosfet. With a PWM signal you can dim the lamp between 0 and 100%. The jumper is in the '5V from adapter' position because this RFP10N10L mosfet has a U_{gs-on} of 5V.

The right mosfet is connector to a normal IO pin. This is allowed because mosfets to not draw any current from this IO pin. We are driving a DC motor with this mosfet. We can only switch this motor on or off because this IO pin has no PWM function.



Inductive loads like this DC Motor need a protection diode to protect the mosfet from inductive voltages generated by this DC Motor. A 1N4001 diode is OK.

CODE EXAMPLE: 'O-500' OR 'O-20'

Switch ON/OFF with a MOSFET

Use the programming instructions 'O-500' when you use one of the 4 power outputs or use 'O-20' for the normal IO pins.

CODE EXAMPLE: 'O-PWM'

PWM with Mosfet

Connect the mosfet to either one of these pwm-pins D3,D4,D5,D6,D9 or D10 and use the programming instructions 'O-PWM' .