O-20 LED

| Required knowledge	LED, Ohm's Law

	led, how leds work, diode
JUST Google It!	binary, hexadecimal, decimal, numeral system
	Ohms law, voltage, current, resistance

Components:

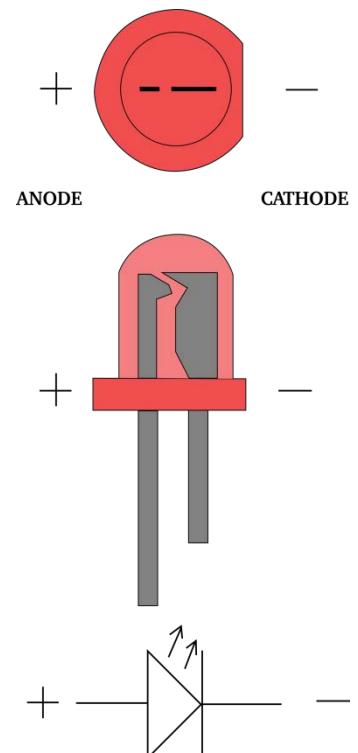| Led	Farnell: 1648981 or own choice
Resistor	To be calculated

1. Pick your led – (Farnell, RS components, Conrad)
2. Refer to the datasheet of the led and find out what the forward voltage of your led is for a 20mA current. For our led we see that this is 3.2Volt.

FIG.1 FORWARD CURRENT VS. FORWARD VOLTAGE.

> Be aware that the maximum current that can be drawn out of any of the pins of our Brainbox Arduino is limited to 40mA. For safety reasons we choose 20mA. The sum of all currents of all IO pins can never exceed 200mA!
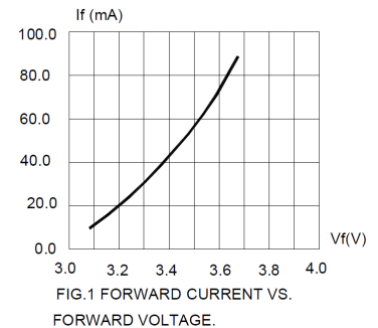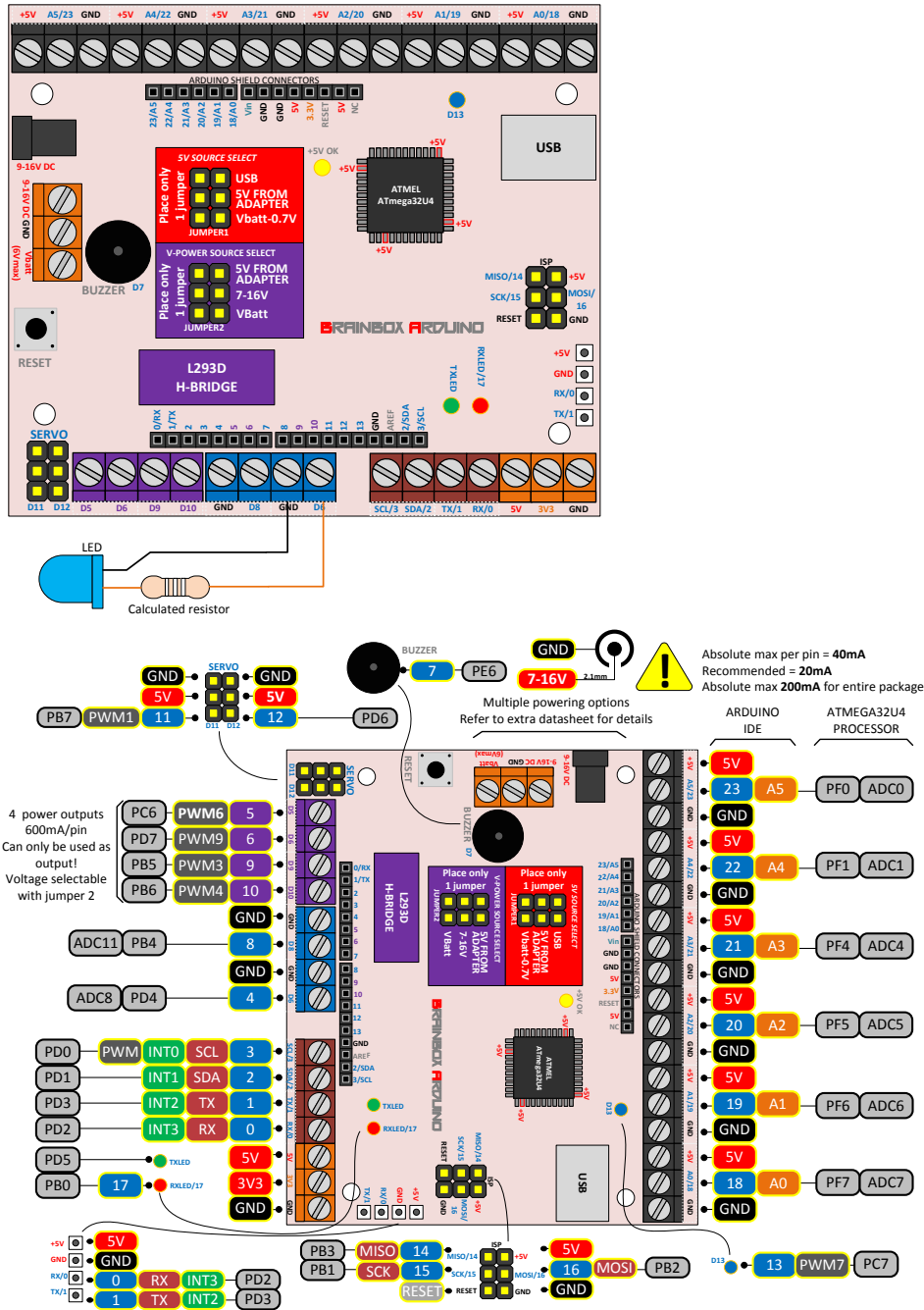
3. Calculate the resistor. The voltage at an active IO pin is 5V.
   o From our example: (5V-3.2V)/0.02A = 90 Ohm
   o Choose the next value from the E12 series: 10 12 15 18 22 27 33 39 47 56 68 82 ….**100** 120 150……
   o For our example we choose 100 Ohm

4. Connect the resistor and the led correctly to a 5V and GND pin of the Brainbox and check with a mA-meter that the current does not exceed 20mA.
5. Be aware that one pin of the LED is an ANODE and the other one is KATHODE.

   (**KNAP**…**K**athode **N**egative – **A**node **P**ositive)

ANODE   CATHODE

6. Connect the led to one of the IO pins of the Brainbox Arduino.

LED
Calculated resistor

Absolute max per pin = **40mA**
Recommended = **20mA**
Absolute max **200mA** for entire package

4 power outputs
600mA/pin
Can only be used as
output!
Voltage selectable
with jumper 2

7. If you wish to dim the led, connect the led to one of the PWM pins – marked with this symbol: **PWM**
   The 4 power output pins (D5, D6, D9, D10) can also be used for this, but be aware that you can set the
   output voltage of these 4 pins with jumper2 (best at 5V).

| CODE EXAMPLE: | ON/OFF | : '**O-20**' |
| CODE EXAMPLE: | PWM | : '**O-PWM**' |