

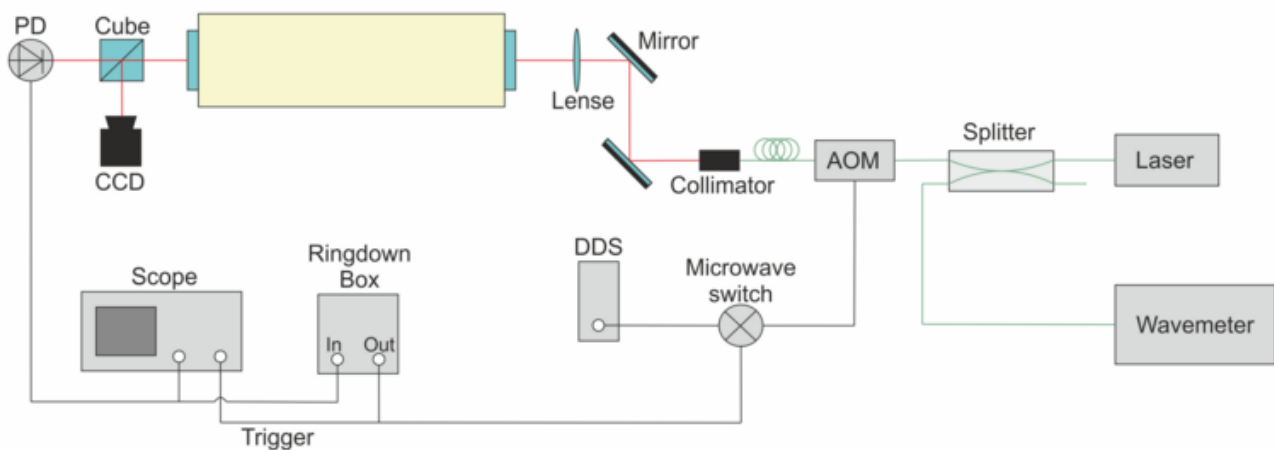
Ring-down Box

Application of the ring-down box

You can measure the finesse of a resonator with the ring-down box **without** locking the resonator!

Advantages

1. super fast (see characterization)
2. without locking the resonator



Measurement Method

Evaluation

Use this formula to analyse the datapoints with x : time, t : delay time

$$y(x) = A \cdot e^{-\frac{x}{t}} + y_0$$

Afterwards calculate the finesse with $F = 2 \pi \cdot t \cdot \text{FSR}$ with FSR : free spectral range.

Electronic setup

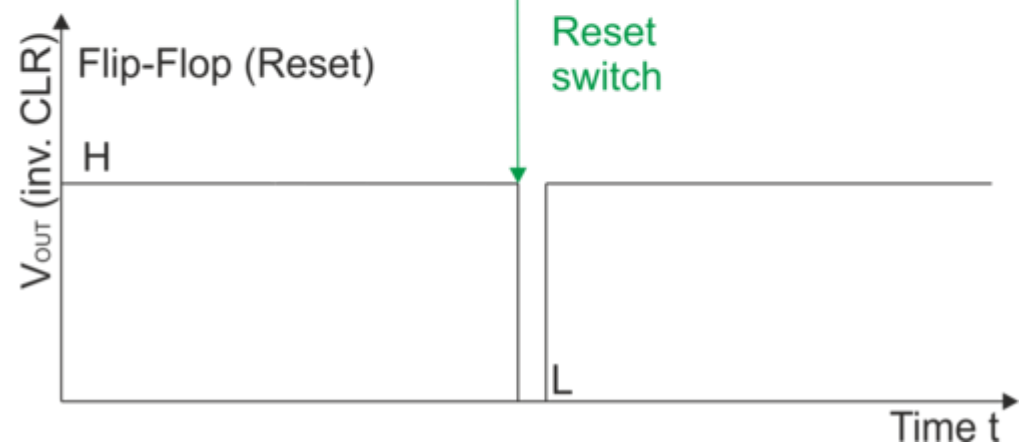
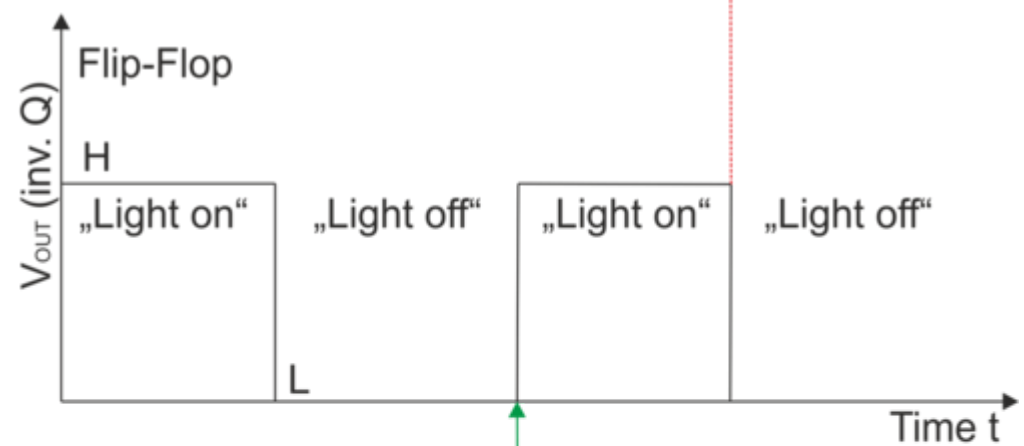
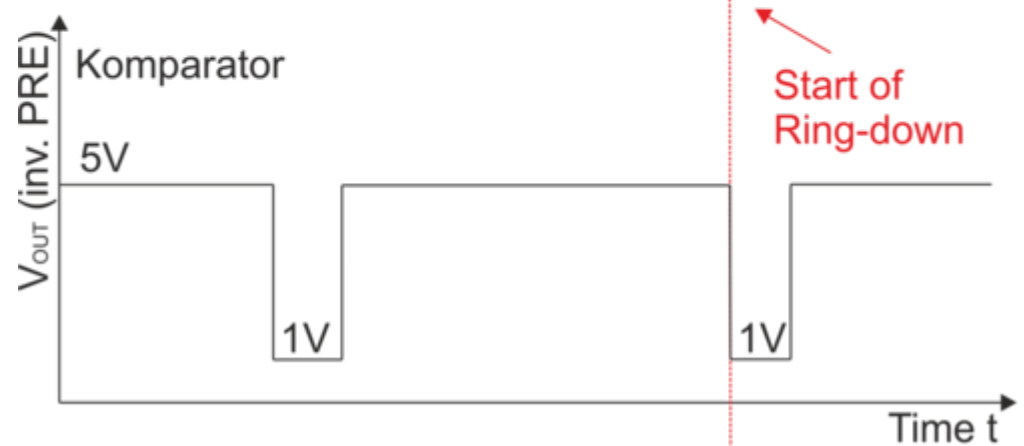
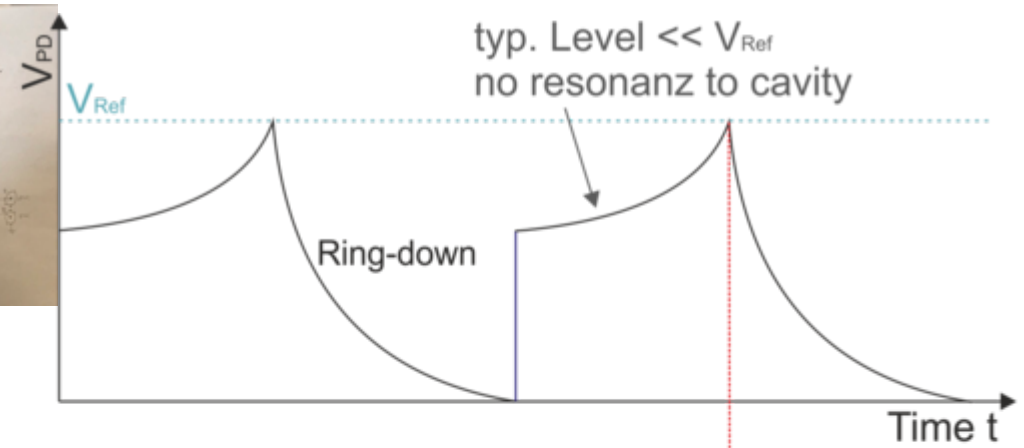
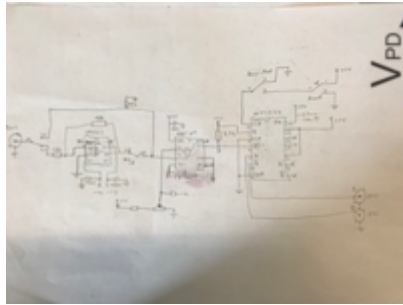
- max. Input PD-voltage: +5V or -5V
- Output TTL (Name: inv. Q): 5V
- Power voltage: +/-15 or +/-18V (max.)

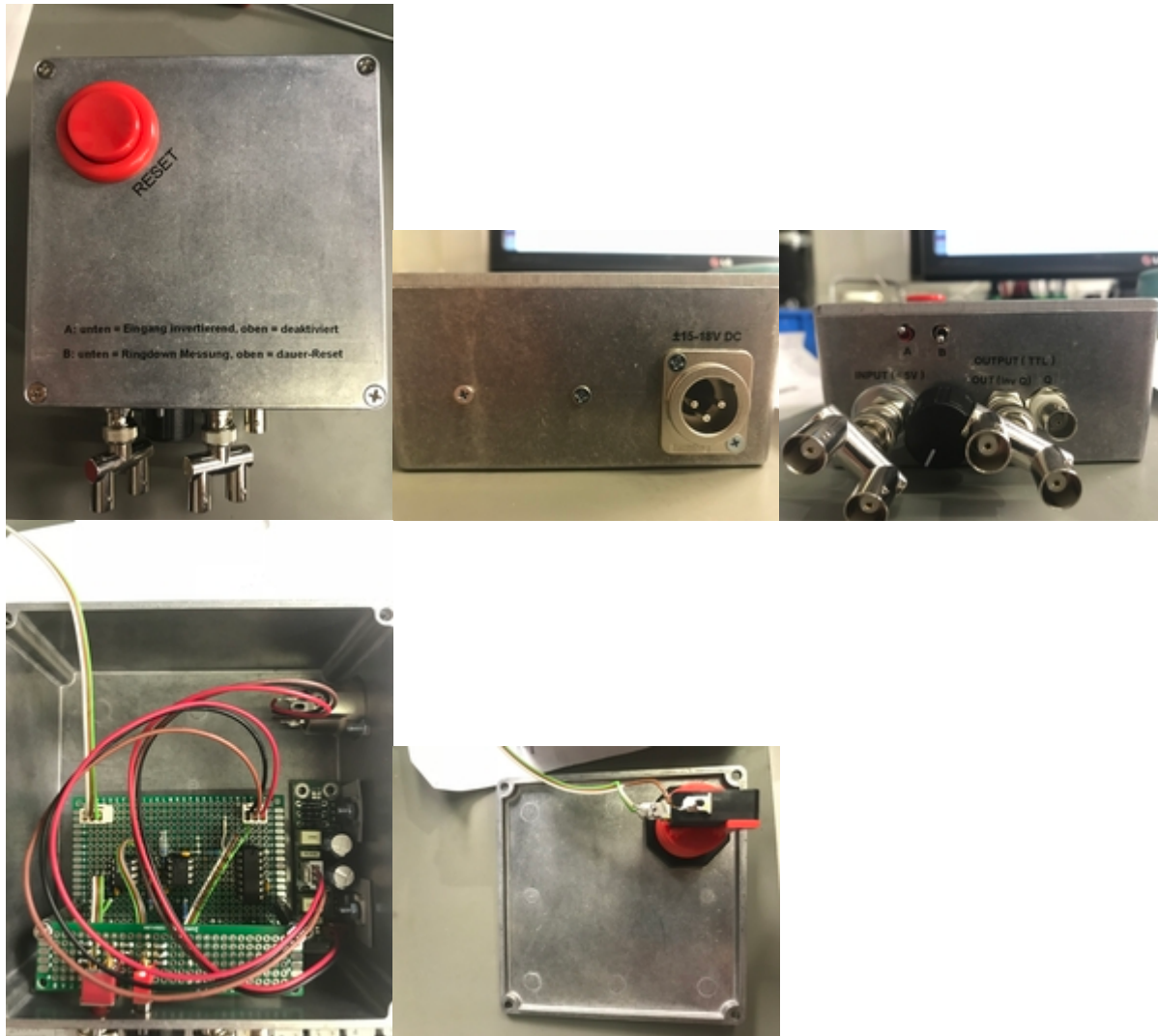
- Switch A: *unten = Eingang invertierend, oben = deaktiviert*
- Switch B: *unten = Ringdown Messung, oben = dauer-reset*

Explanation of the operating principle

- Electronic drawing:

Electronic drawing_Ring_down_Box





Characterization

List of components

- Inverter: LT1363
 - Invert negative input voltage to positive
 - Datasheet_LT1363
 - Power supply: +/-5V
- Comparator: AD8561
 - Compare input voltage and threshold value
 - Datasheet_AD8561
 - Power supply: +/-5V
 - High speed timing: 7ns @ 5V
- Flip-Flop: SN74HC74
 - Output of trigger
 - Datasheet_SN74HC74

- Power supply: +5V
- High speed timing: 15ns

- 1x XLR connector
- 1x Power supply +/-5V
- 1x single switch
- 1x double switch
- 3x BNC connectors
- 1x Potentiometer
- 1x big red button
- 2x 8-pin IC socket
- 1x 14-pin IC socket
- 3x PSK 3-pin cables
- 5x 100n capacitors
- some resistors (3x 100k, 1x 4.7k, ...)
- 1x Al-box
- 2x PCBs

Microwave switch

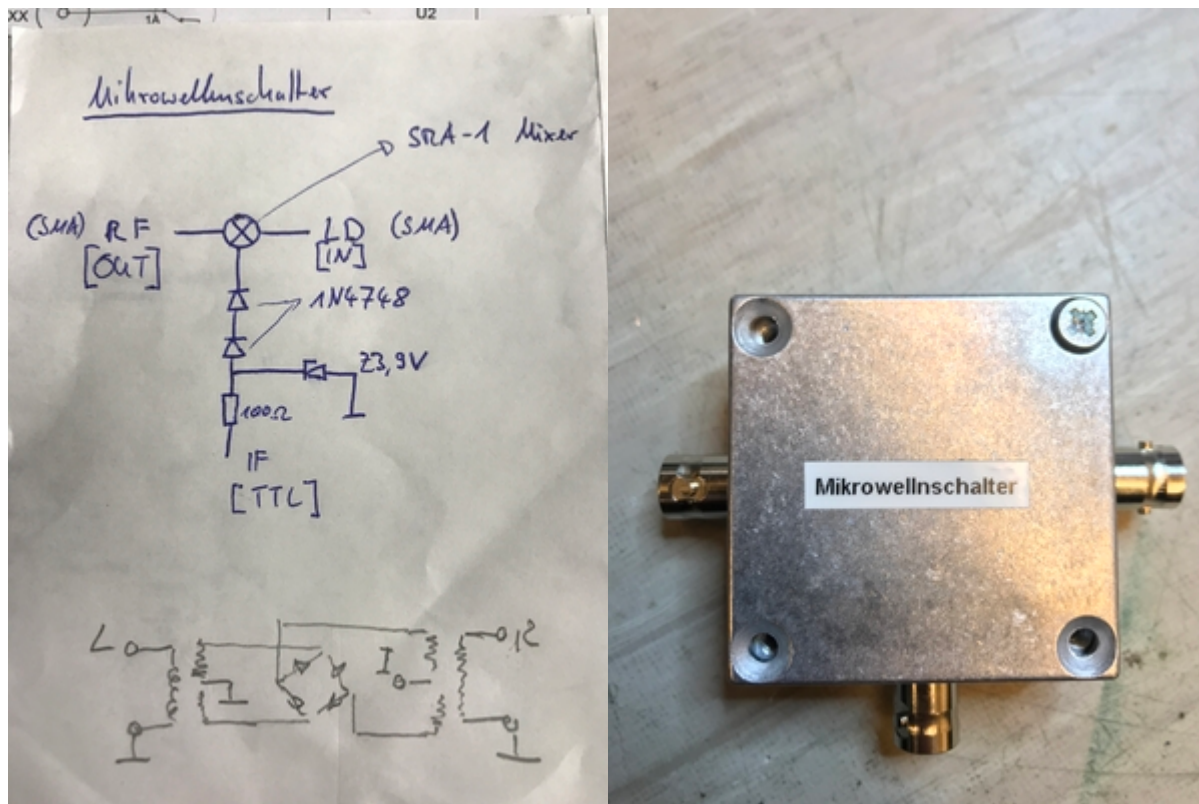
- Control of RF signal to the AOM
- Mixer typ: SRA-1+ (

Datasheet_SRA-1+

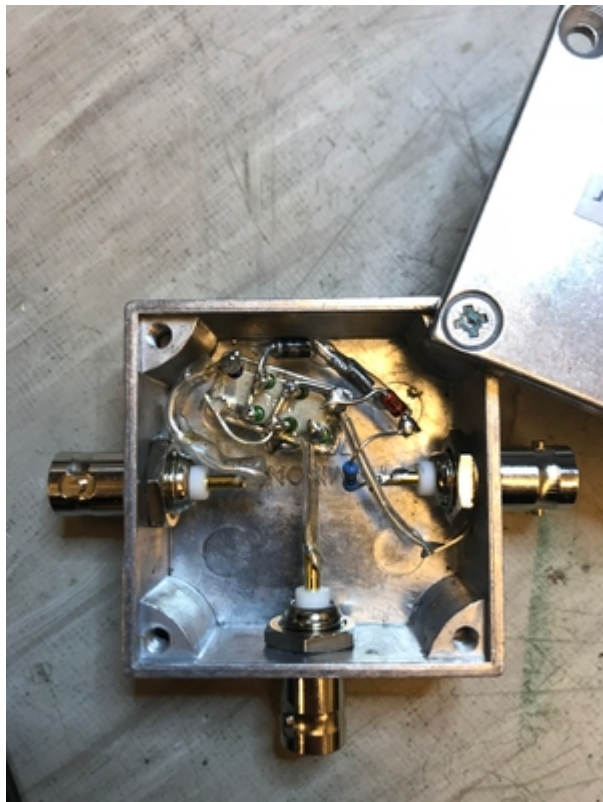
-)
- 1x Resistor (100 Ohm)
- 2x diodes (type: 1N4748)
- 1x diode (type: Z3,9V)
- 3x BNC connectors
- 1x Al-Box



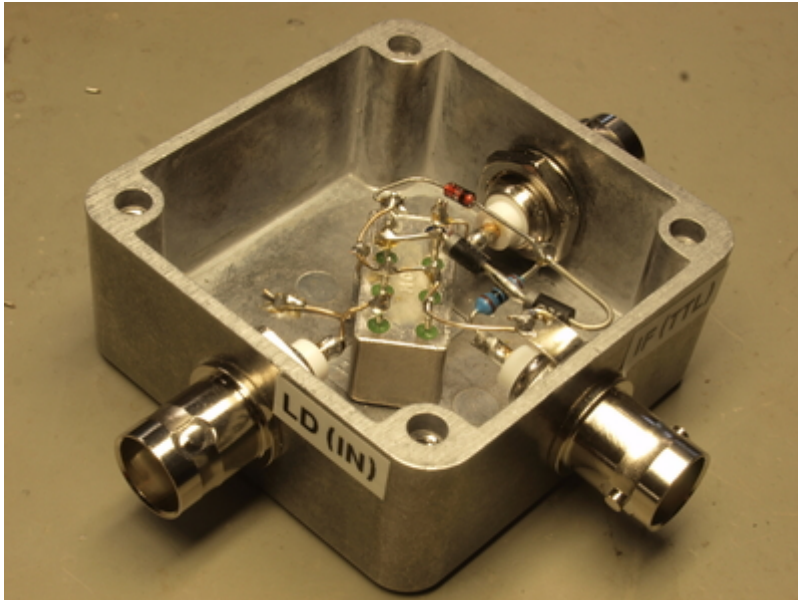
Connect all ground pins to ground, also the housing



Do **NOT** build it like this



Rather build it like this:



Make sure that the input and output are as far apart as possible and the connections to the switch form a straight line. Otherwise the input line acts as an antenna and a part of the rf signal passes to the output if the switch is closed. For the same reason, try to make the wires within the box as short as possible.

Also make sure to solder the shielding of the IC directly to the box. It makes the switch work A LOT better.

From:

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