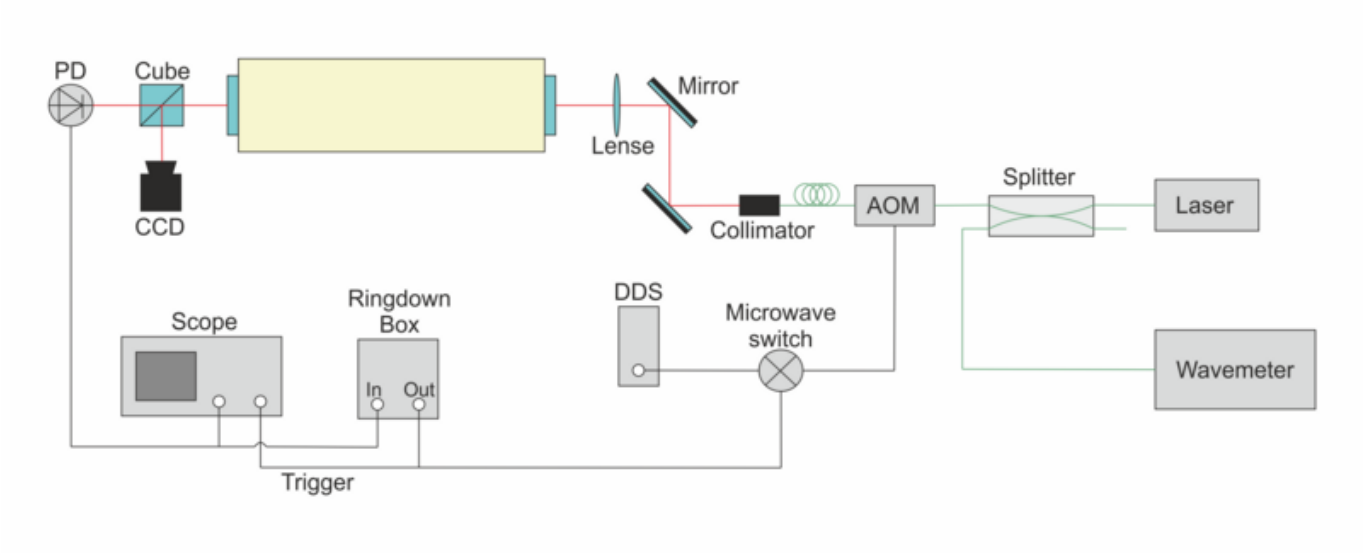
Ring-down Box

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:
y(x)=A*exp^(-x/t)+y0 with x:=time, t:= delay time

Afterwards calculate the finesse with F=2pi*t*FSR with FSR:=free spectral range.

Electronic setup

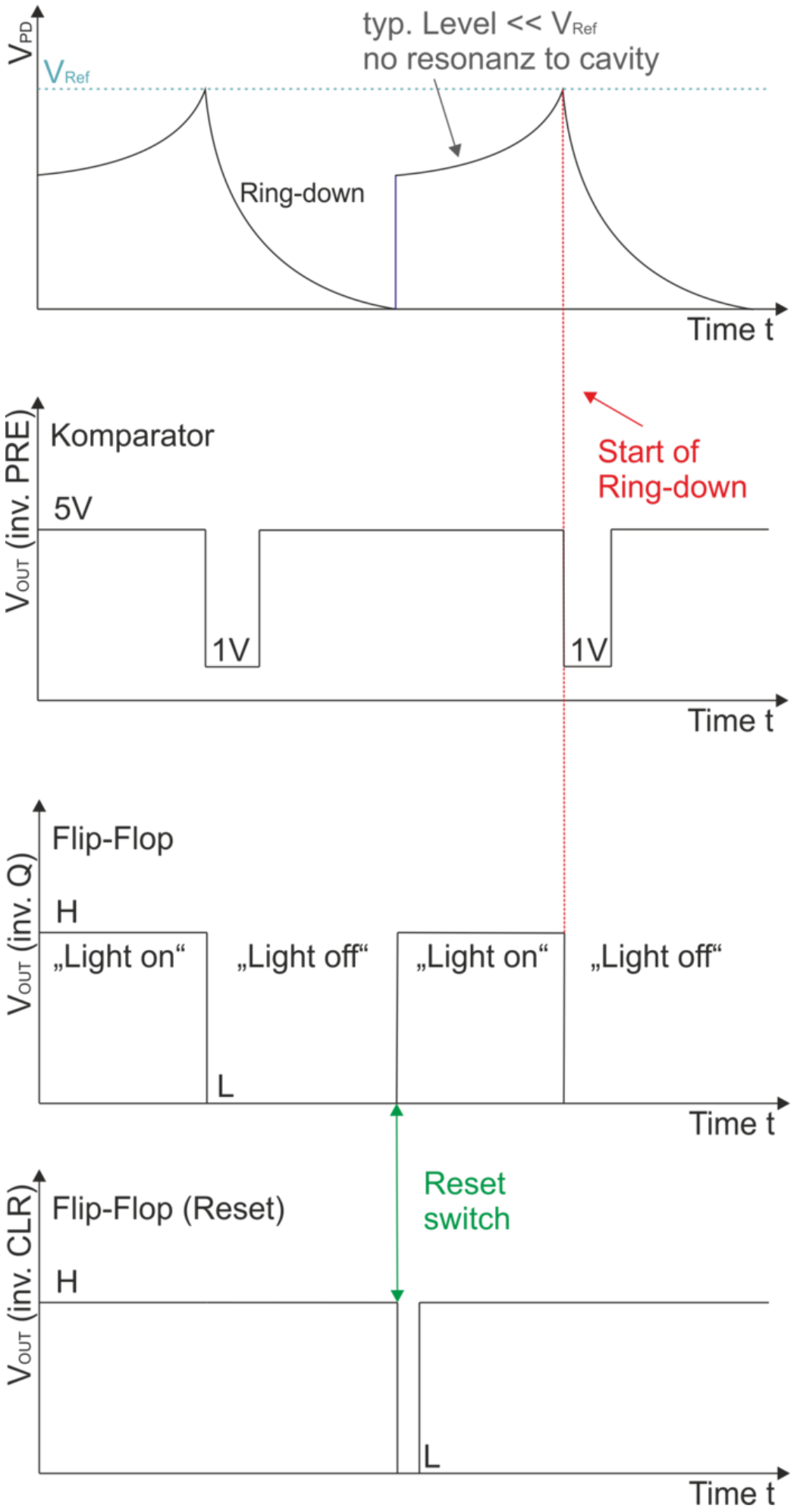
- max. Input PD-voltage: +5V or -5V
- Output TTL (Name: inv. Q): 5V
- Power voltage: +/-15 or +/-18V (max.)

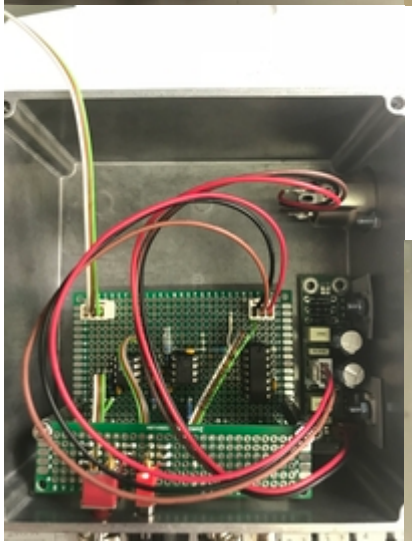
- Switch A: *unten = Eingang invertierend, oben = deaktiviert*

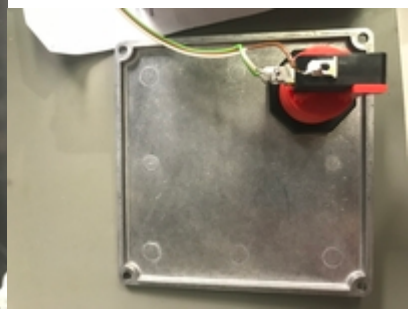
- Switch B: *unten = Ringdown Messung, oben = dauer-reset*

Explanation of the operating principle

- Electronic drawing (PDF-file)


V_{PD}
V_{Ref}
typ. Level << V_{Ref}
no resonanz to cavity
Ring-down
Time t
Komparator
V_{OUT} (inv. PRE)
5V
1V
1V
Start of
Ring-down
Time t
Flip-Flop
V_{OUT} (inv. Q)
H
„Light on“
„Light off“
„Light on“
„Light off“
L
Time t
Reset
switch
Flip-Flop (Reset)
V_{OUT} (inv. CLR)
H
L
Time t





Characterization

List of components

- Inverter: LT1363
  - Invert negativ input voltage to positiv
    - 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 connctors
- 1x Potentiometer
- 1x big red button
- 2x 8-pin holder
- 1x 14-pin holder
- 3x PSK 3-pin cables
- 5x 100n capacitors
- some resistors (3x 100k, 1x 4.7k, ...)
- 1x Al-box
- 2x PCB´s

Microwave switch

- Control of RF signal to the AOM
- Mixer typ: SRA-1+ (
  Datasheet_SRA-1+
)
- 1x Resisitor (100 Ohm)
- 2x diodes (tyo: 1N4748)
- 1x diode (typ: Z3,9V)
- 3x BNC connectors
- 1x Al-Box

But all ground pins on ground, also the housing