

**INTERCONNECTION TEST  
with B field and power pulsing  
mode performed at DESY**

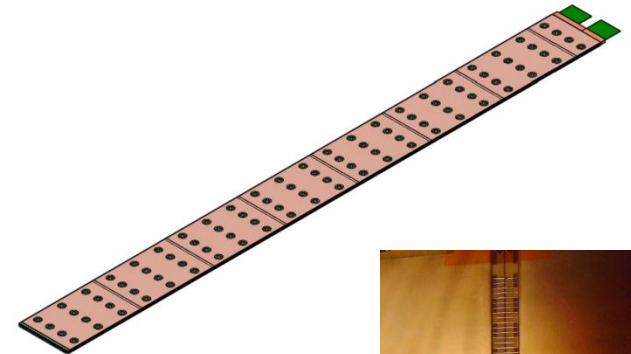
*CALIIMAX ANR (LLR/LAL)*

# CALIIMAX: task 3

- Qualification of the detector modules in high magnetic field environment and when large currents are turned ON/OFF (power pulsing)
  - Mechanical stress due to Lorentz forces
  - Resonant vibration of wire bonds
  - Collective effects due to the power pulsing : switching of many amps in low impedance lines



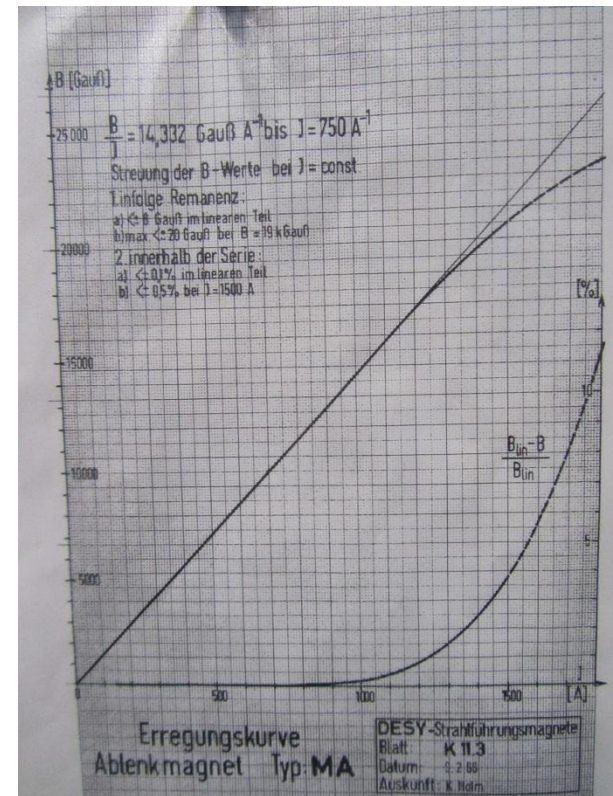
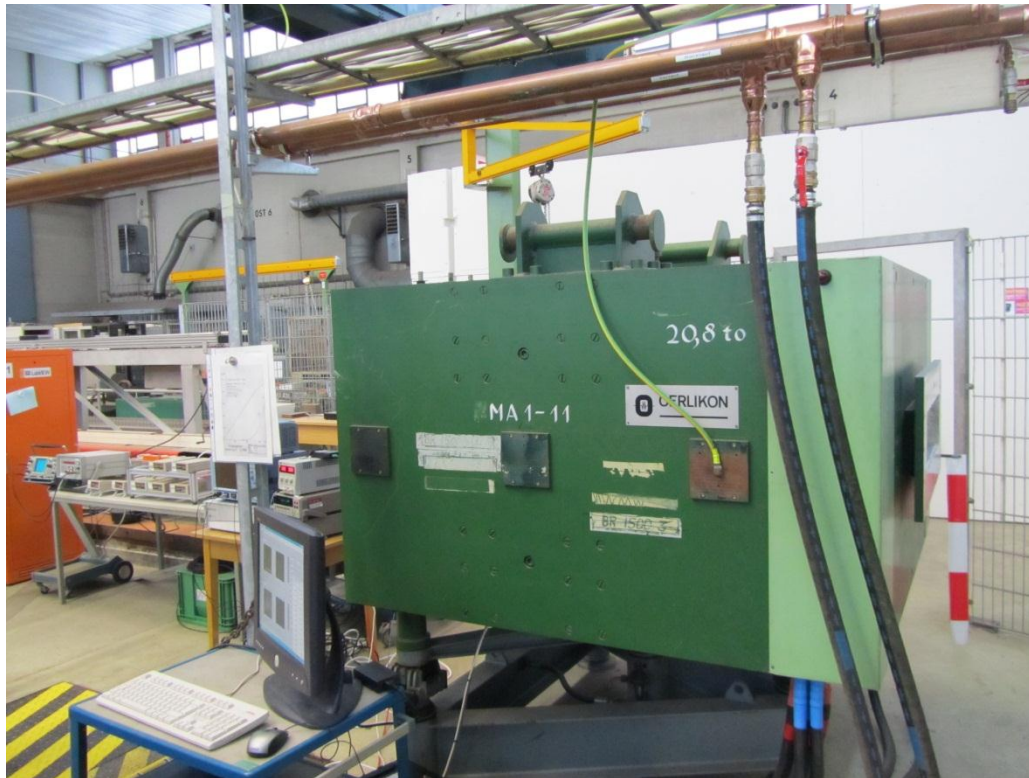
1 SLAB= 7 ASUx 16 chips x 123 mA = 14 A



# DESY SETUP

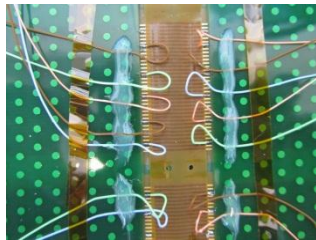
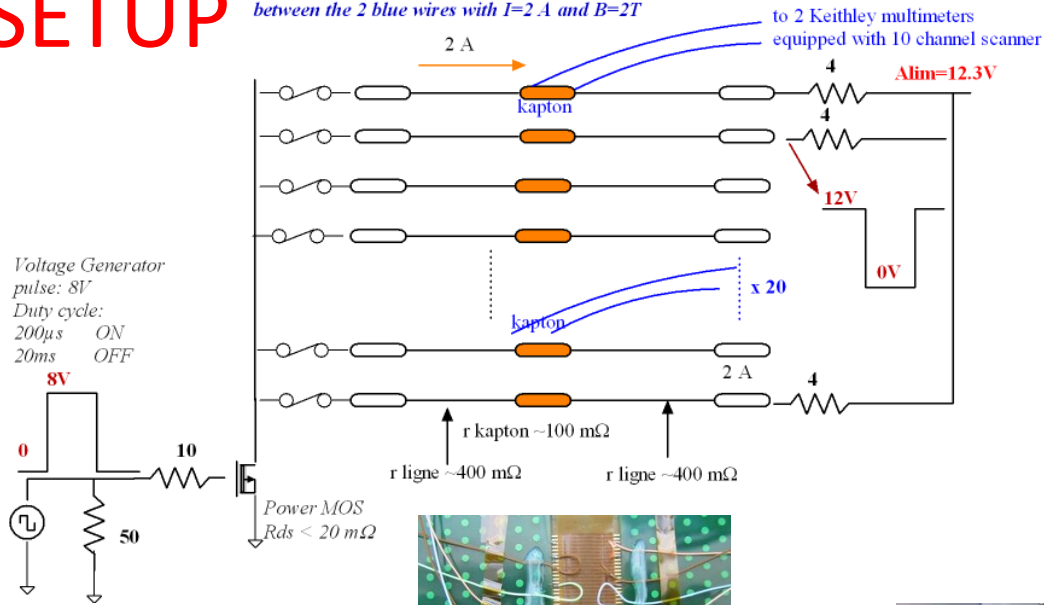
- Use of one of DESY Magnets, mid february 2013: B field up to 2T

*Many thanks to Yorck Holler and Joerg Ludwig*

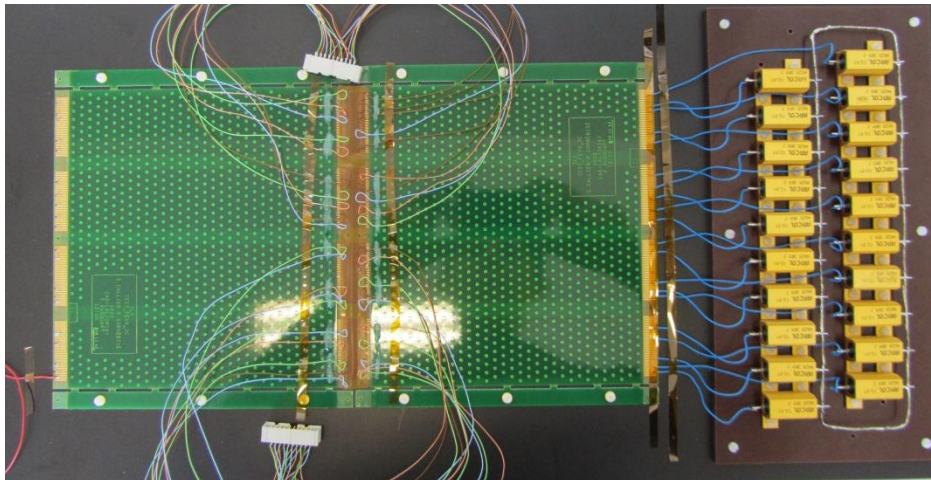


# SETUP

Measurement of the interconnection resistance between the 2 blue wires with  $I=2\text{ A}$  and  $B=2\text{ T}$



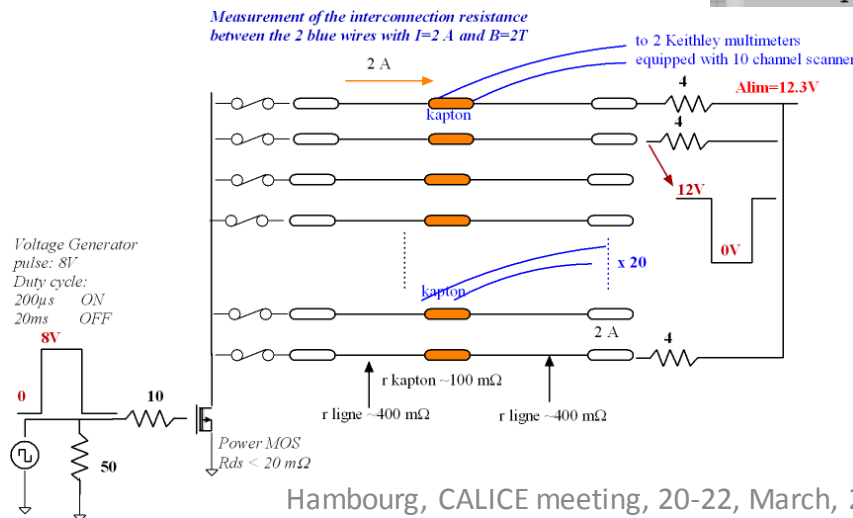
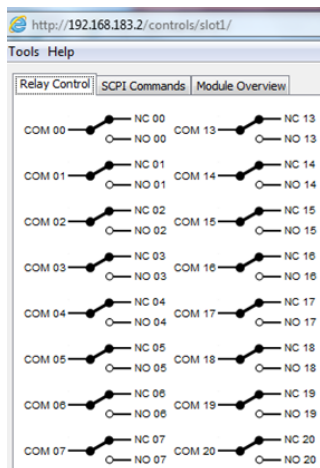
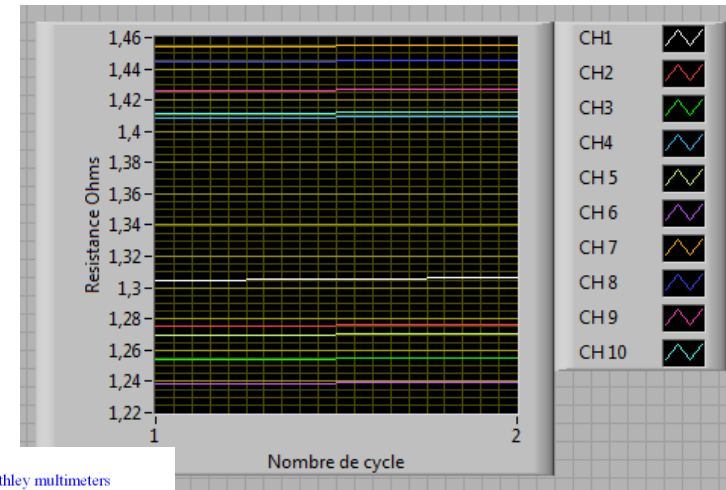
@Patrick Corneise



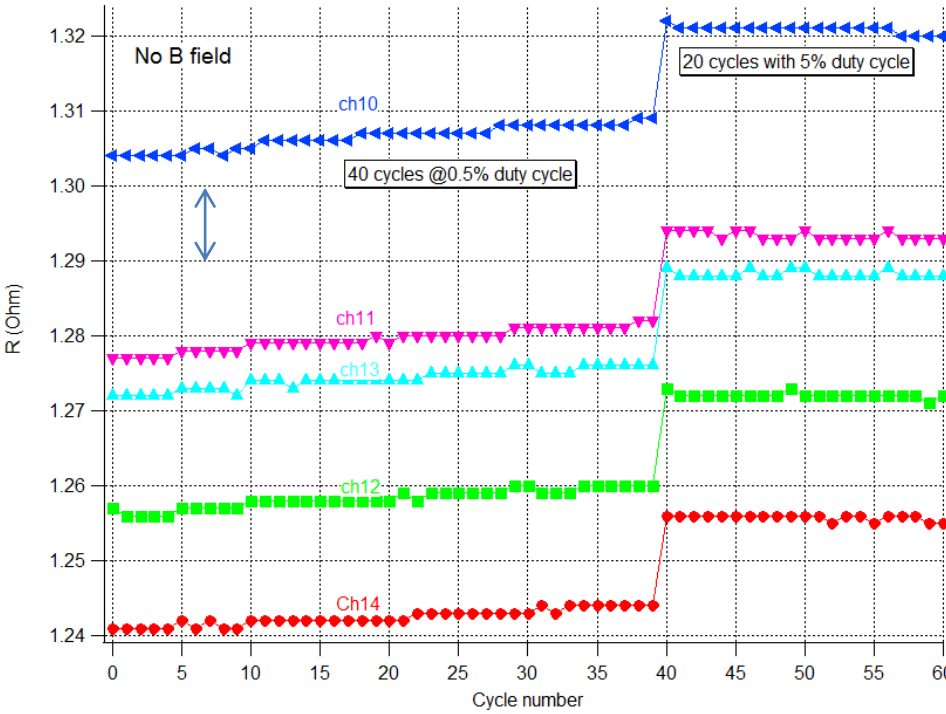
Hambourg, CALICE meeting, 20-22, March, 2013

# Various configurations

- Test wo and with B field (2T), various duty cycles and frequencies
- 20 interconnections, 1 cycle= each of the 20 switches closed one after one, during x s :
  - Each switch closed during 1s, pulses of 12 V in  $4\ \Omega + 1\ \Omega$  (parasitics)=2.4 A , 100  $\mu$ s, every 20 ms
  - => Duty cycle=0.5% and  $1s/20m=50$  pulses of 2.4 A in each switch during one cycle

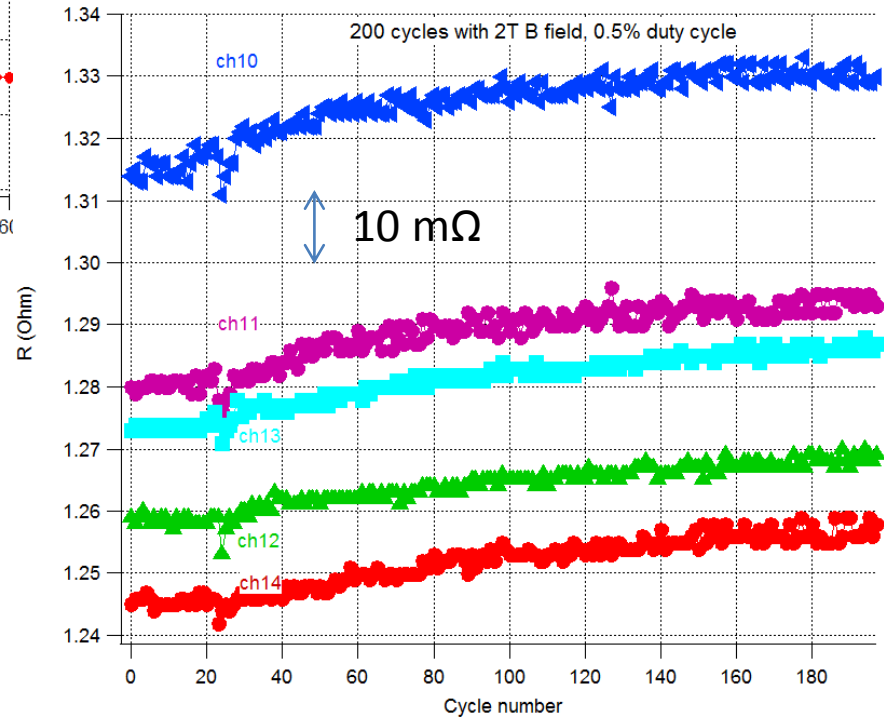


# No field, 0.5% and 5% duty cycle

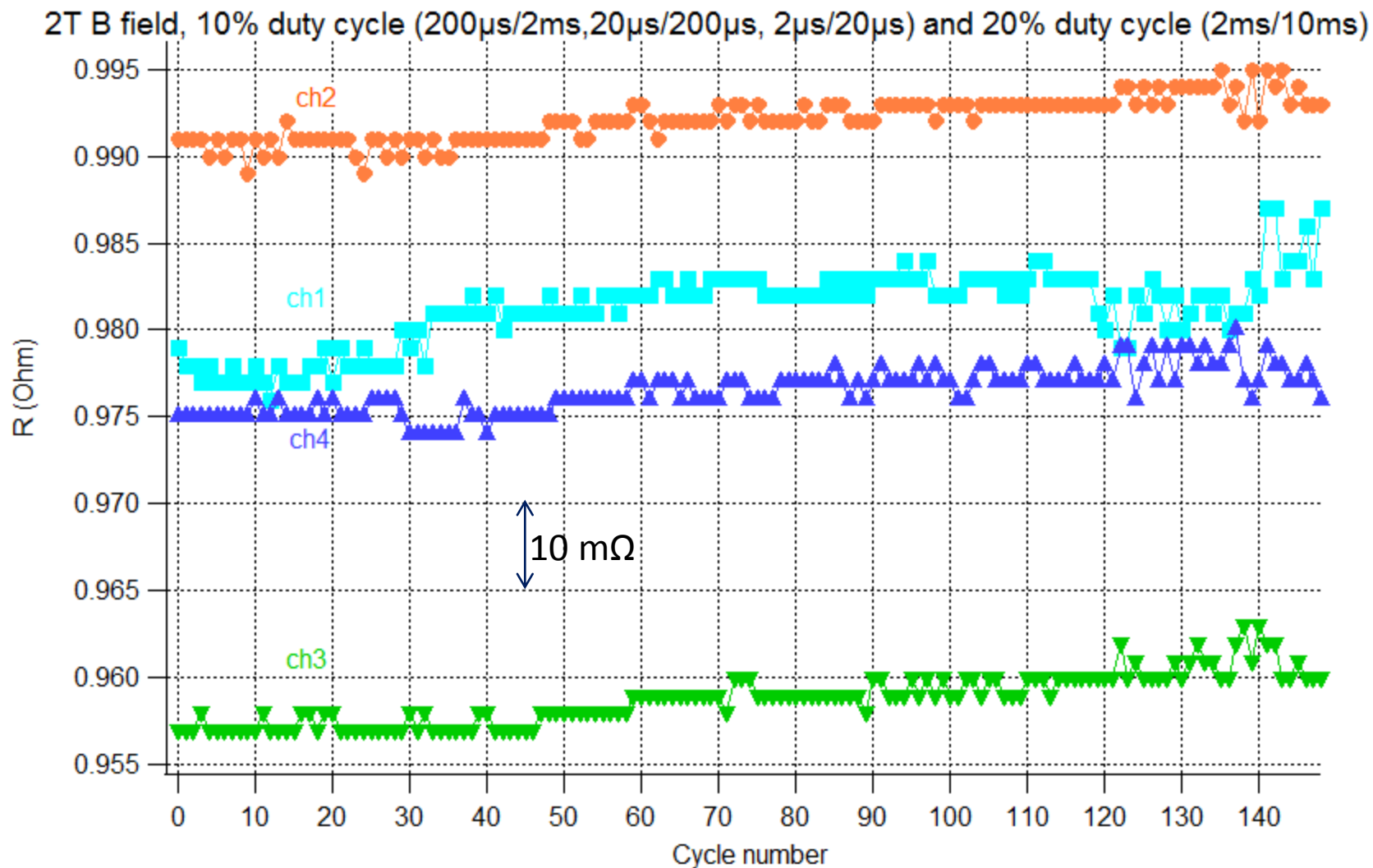


200 cycles = 3 hours

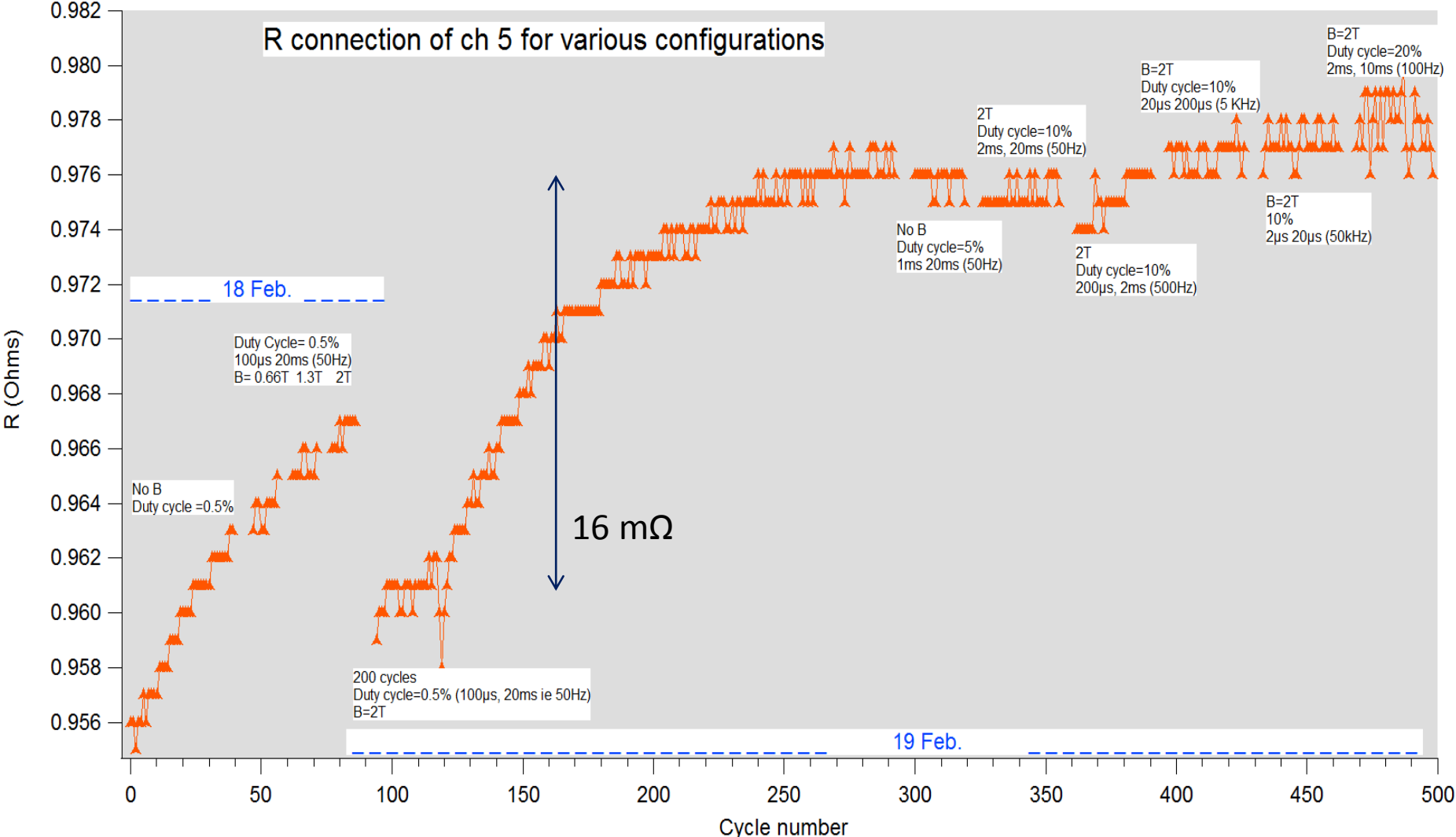
2T B field, 0.5% duty cycle



# 2T B field, 10 and 20% duty cycle



# Zoom on 1 channel with various configurations





# CONCLUSION

- Test of the resistance of the interconnections under various configurations:
  - 2 Amps flowing in the interconnection, with a 2 T magnetic field, duty cycles from 0.5 % up to 20%, frequencies from 50 Hz up to 50KHz
- The resistance of the interconnections varies by about 20 mΩ (thermal effects)
- 1 SLAB with 4 SKIROC2 chips (in package) power pulsed in 2T field: pedestal unchanged (cf Yuji SUDO talk)
- To be done: 1 long slab (7 ASUs) equipped with ASICS (7x16) to be tested under 2 T B field