TD18_VG2.4_Quad_#5 (1) S-parameter as of machined

Feb. 6, 2009

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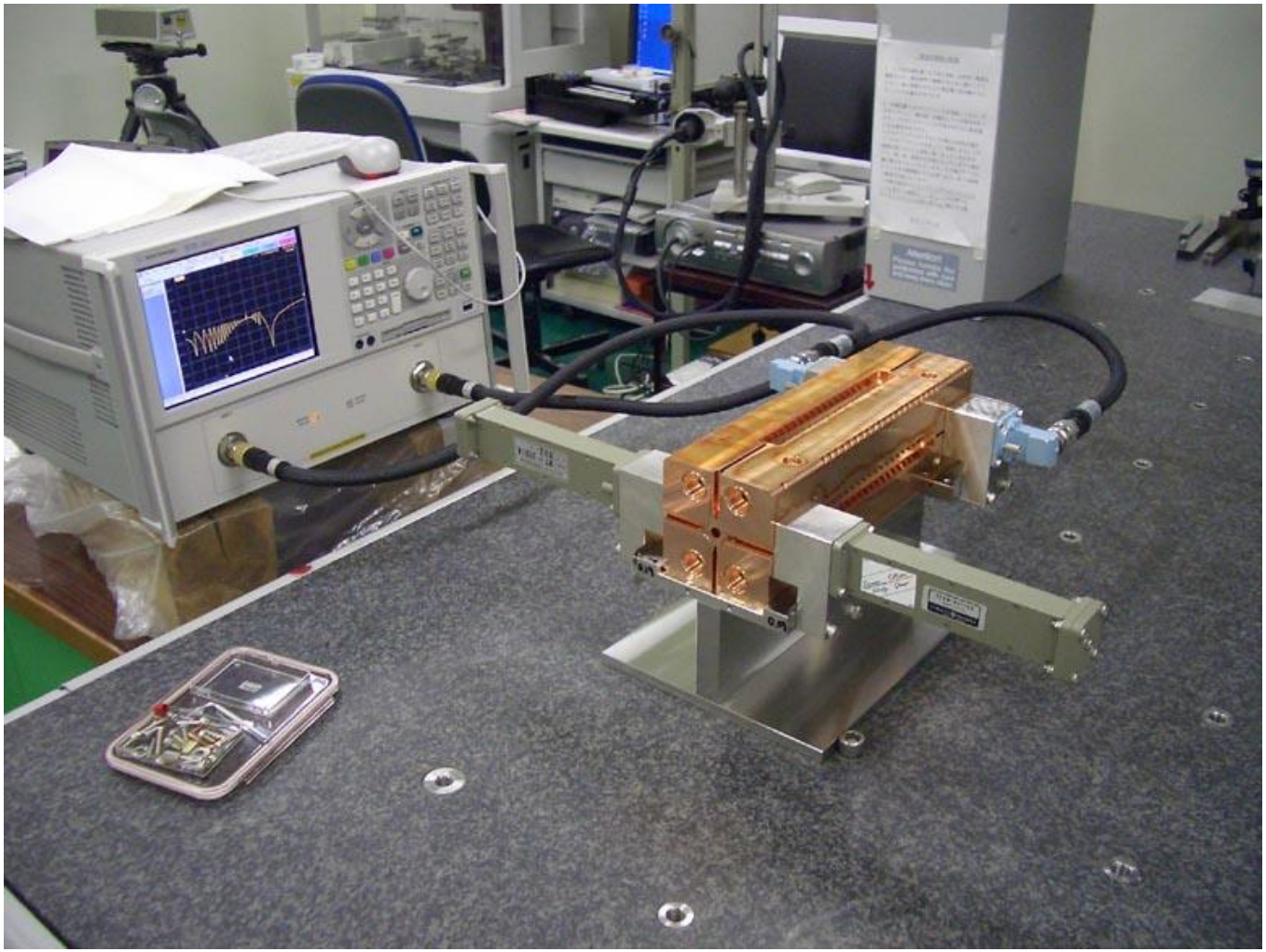
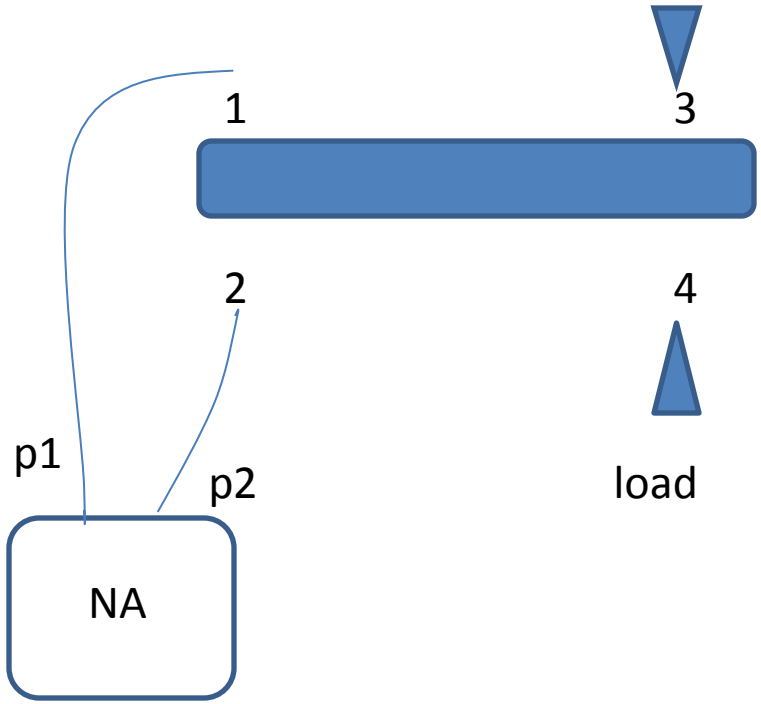
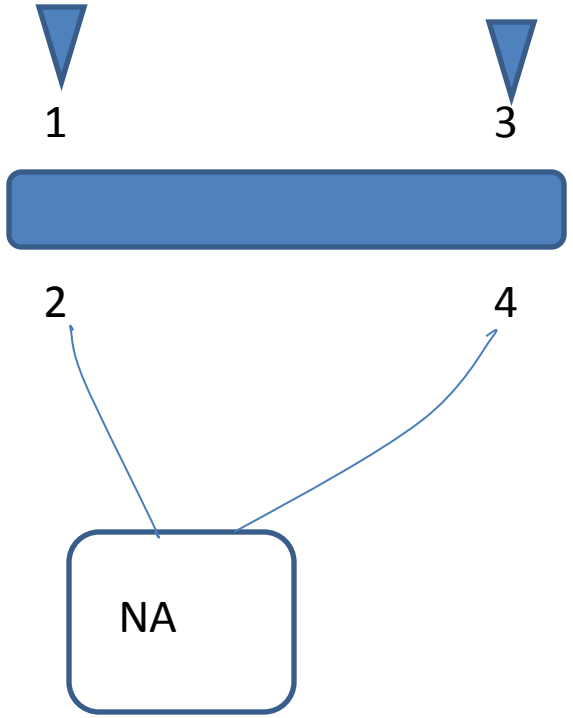
First time measurement



First time measurement

- Meas. Setup and formula





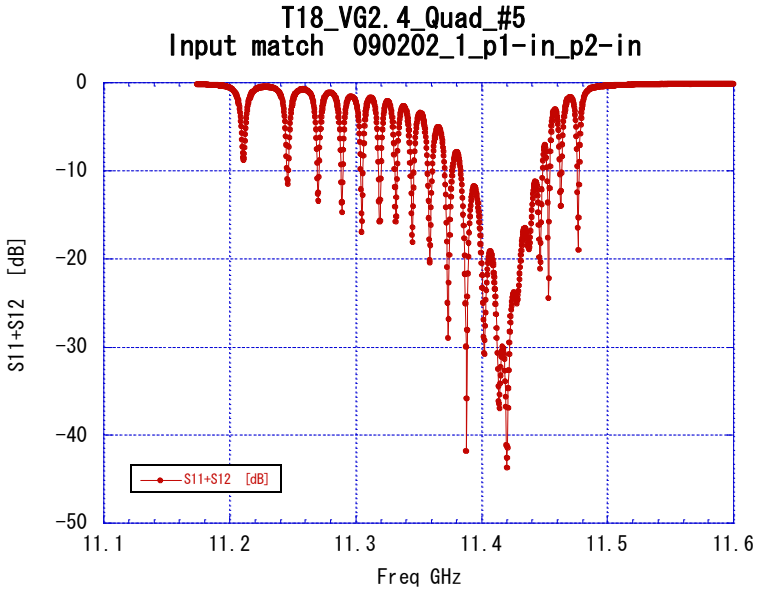
$S_{match} = S_{11}+S_{12}$

$S_{transmission} = 2*S_{42}$

First time measurement

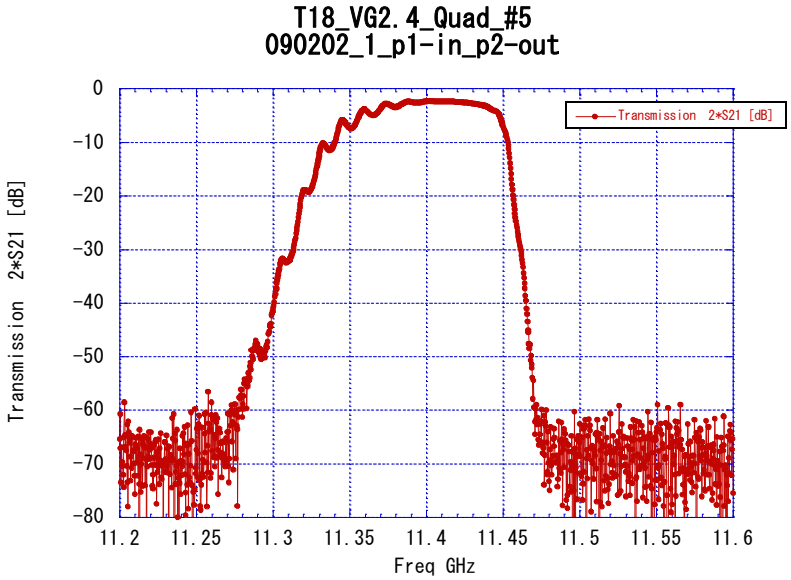
- Based on the formula of previous page

090202



-24dB @ 11.424GHz

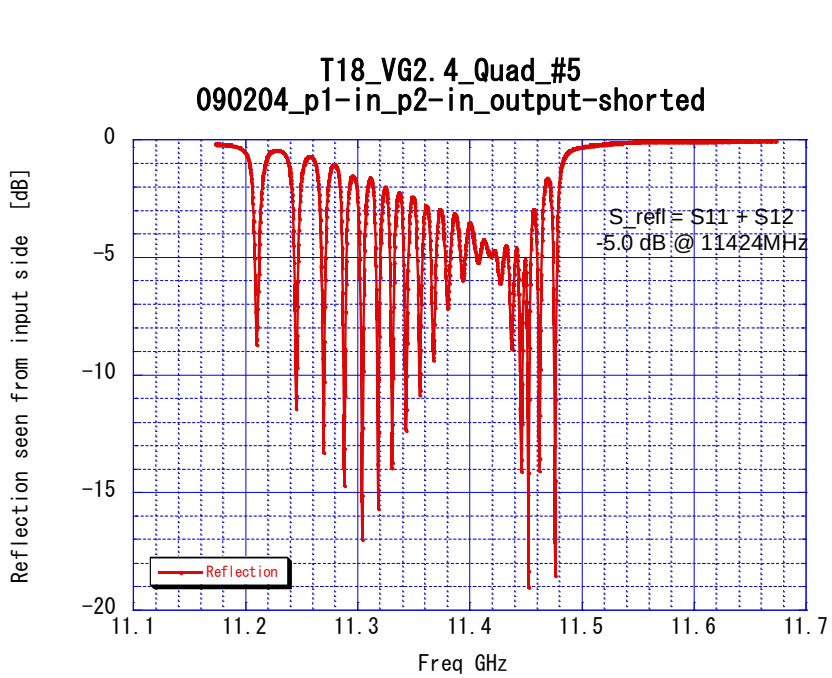
090202

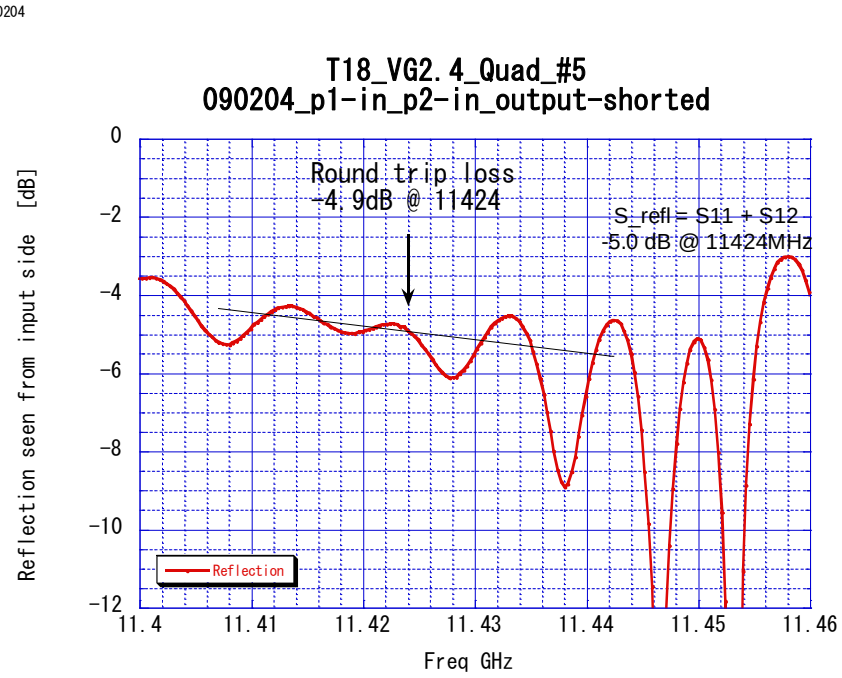


-2.56dB @ 11.424GHz

First time measurement

- Output ports are shorted

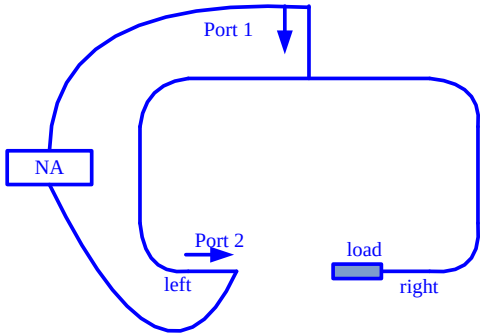




Transmission loss = -2.45dB

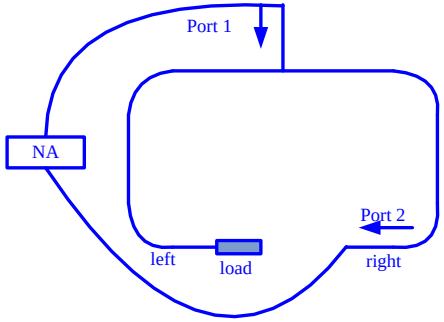
Second time measurement

- Hybrid calibration



S21_left=-3.20dB

S21_right=-3.26dB



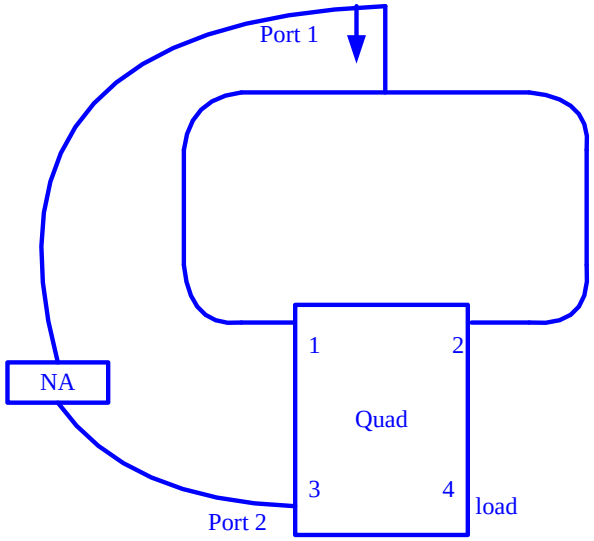
we can get the average value:

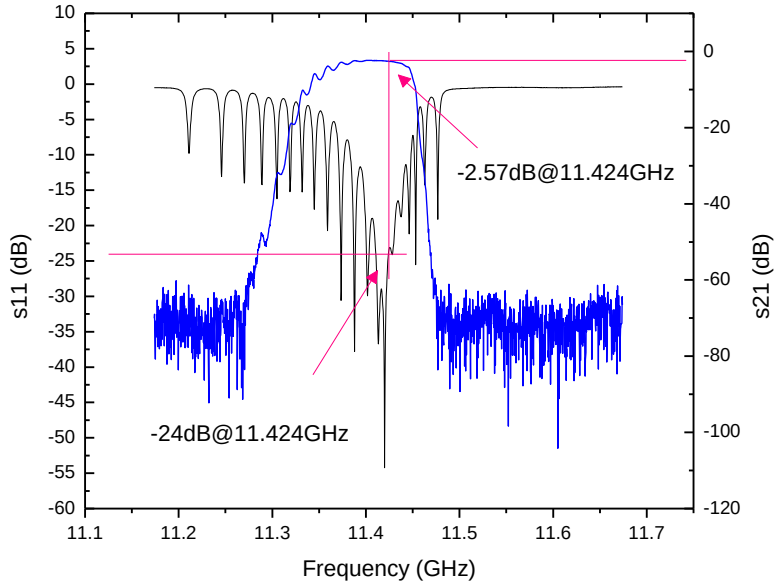
S21_average=-3.23dB

Second time measurement

- Test results using hybrid

From the test results, we use the average value -3.23dB fitting the test data and get S11=-24dB, S21=-2.57dB





Comparision@11.424GHz

	Design value	First time measurement		Second time measurement
		Transmission	Short	
S11		-24dB		-24dB
S21	-1.85dB	-2.56dB	-2.45dB	-2.57dB

Transmission	-2.45dB meas. by reflection -2.56dB meas. by transmission

Comment on transmission CERN / KEK

- CERN case from Riccardo (mail on 090210):
- Pin (at the input waveguide; sum of the two input waveguides)
  P2 at the first regular cell Pin*(1-0.032)
  P3 at the output regular cell P3=P2*0.6526=Pin*(1-0.032)*0.6526
  Pout at the output waveguide Pout=P3*(1-0.032)=Pin*(1-0.032)^2*0.6526=Pin*0.6115
- which corresponds to τ=0.246 or to S21= -2.136 dB
- Measurements at CERN for TD18_quad made in CERN give -2.23 dB.

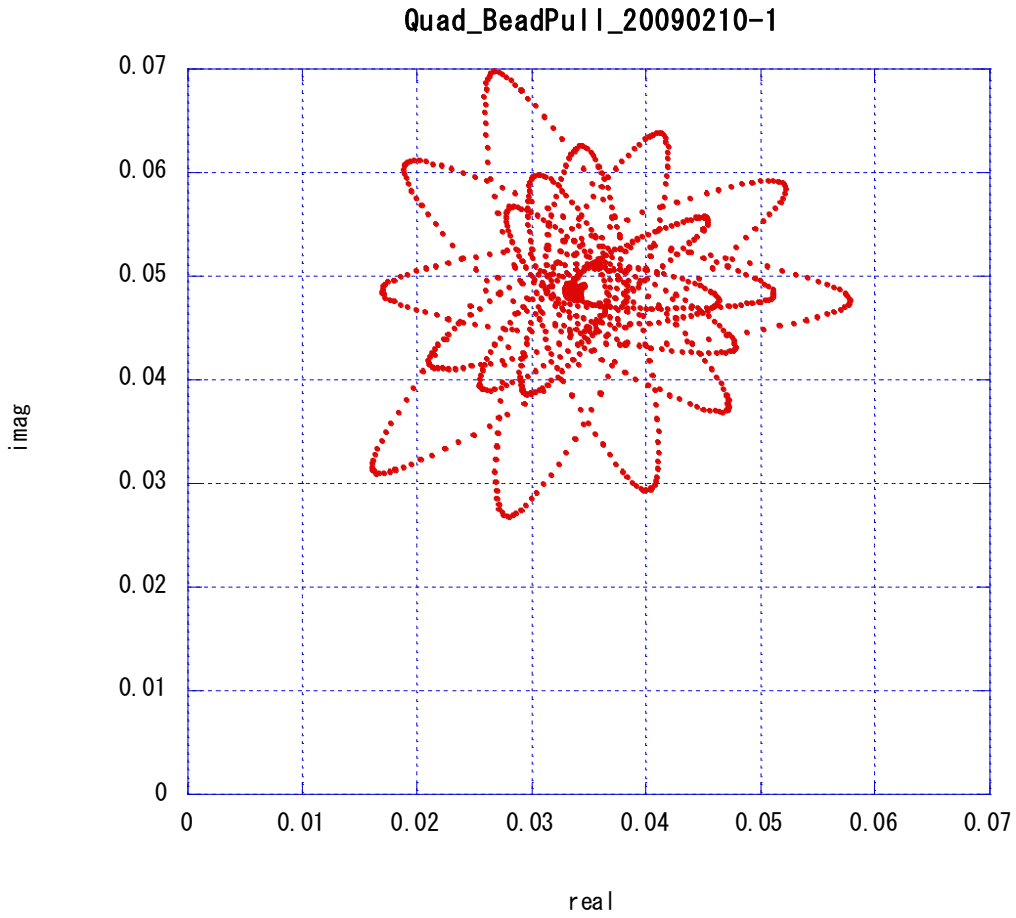
- Comparing to this, KEK quad gives 2.56dB measured in transmission mode. About 0.33dB more attenuation due to some reason.
- -2.56dB = τ=0.295 → Q/Q~83% is all attributed to τ~1/Q

Quad #5 low power measurement (2) Bead pull as of machined

Feb. 10, 2009

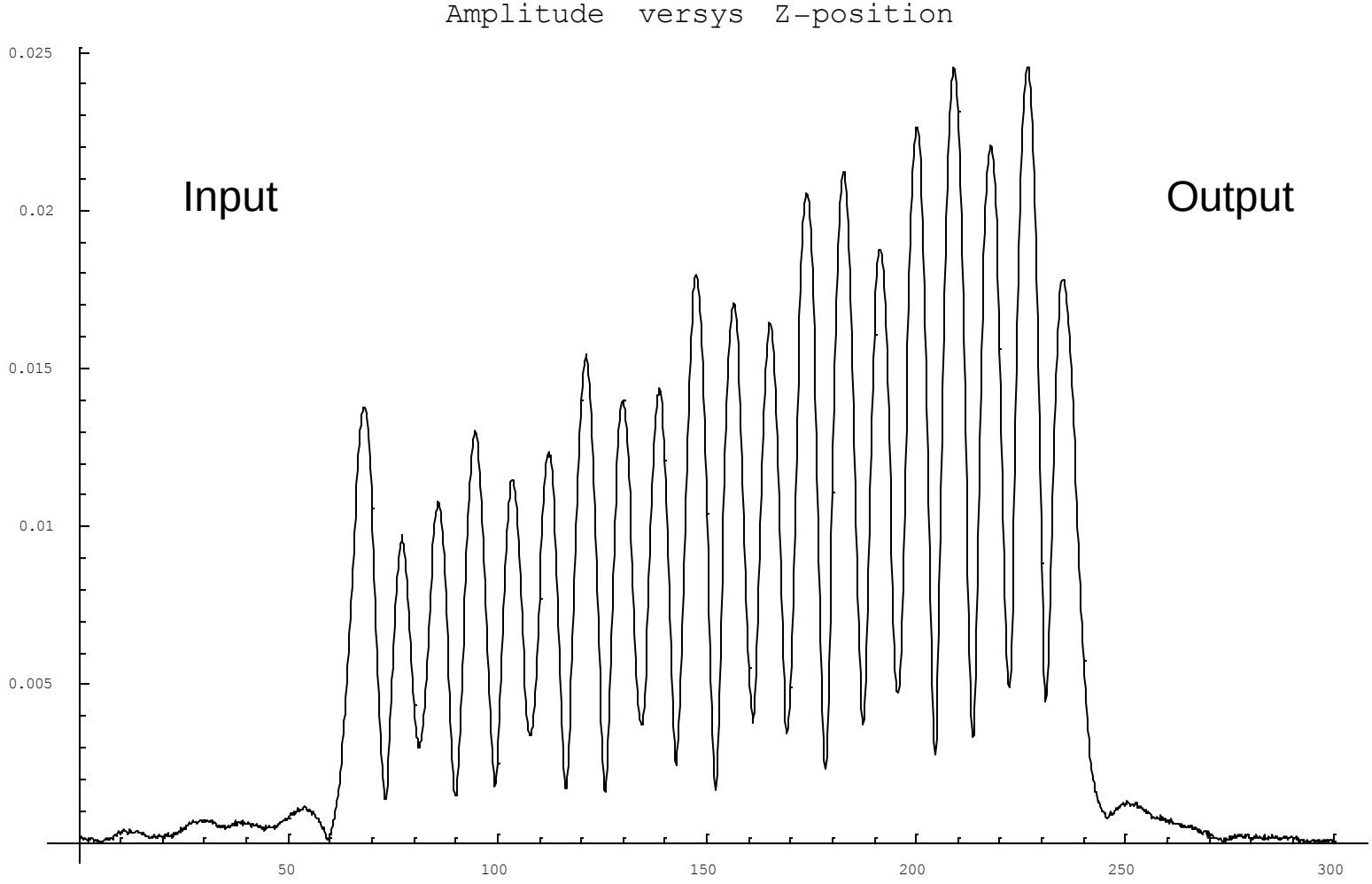
T. Higo, K. Yokoyama and J. Zhang

at 11424MHz

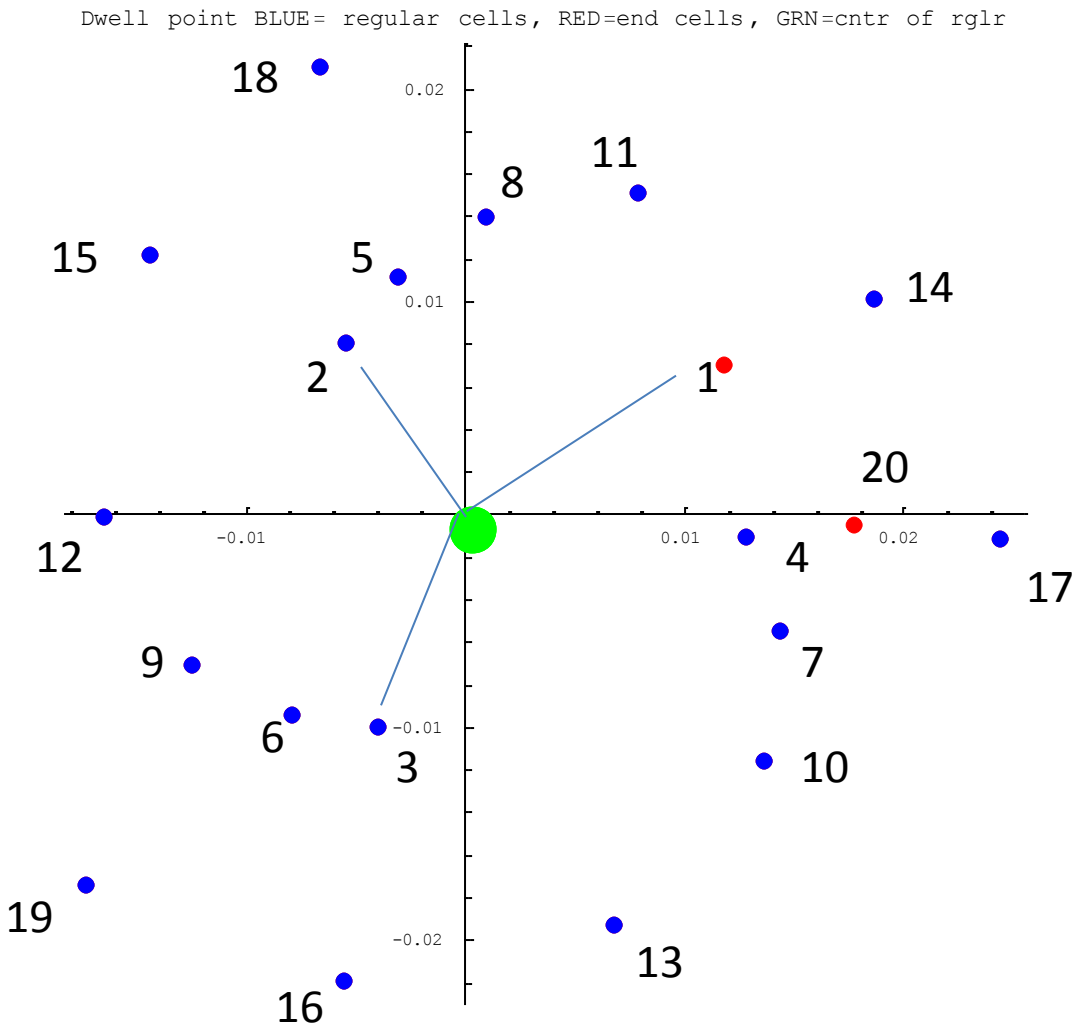


Measurement
N5230A F_IF=1kHz, 3pts
Freq=11424MHz
Tcavity=20.9C
Pulse motor step ~ 0.2mm
RF Input from input coupler side

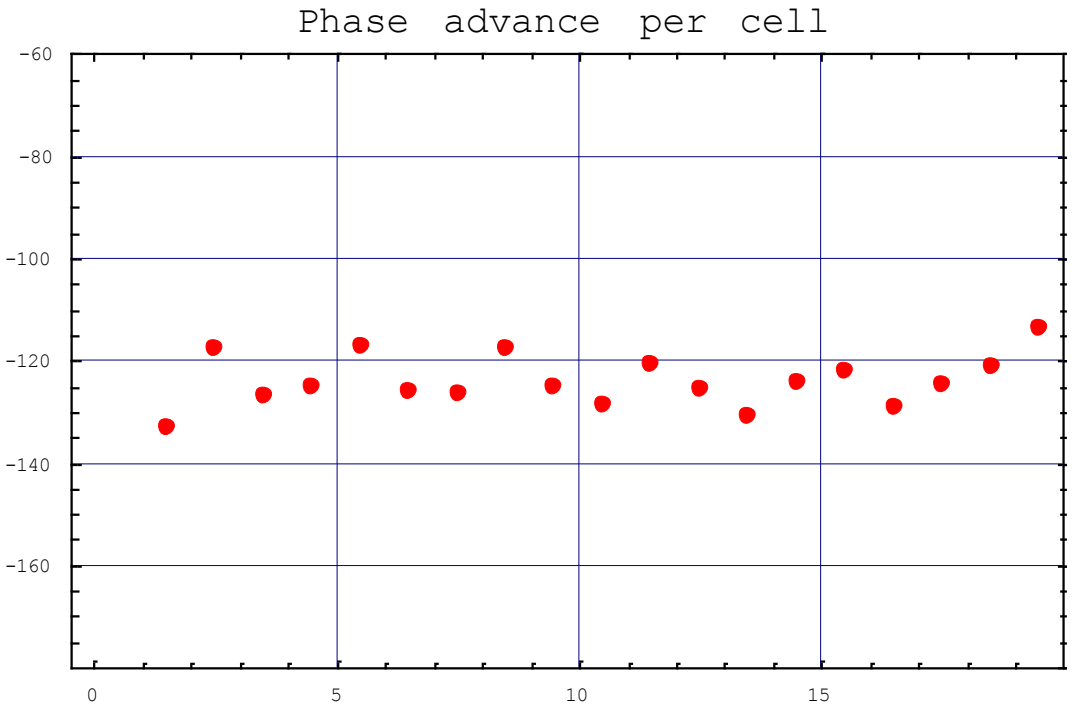
Bead reflection amplitude



Dwell points



Phase advance

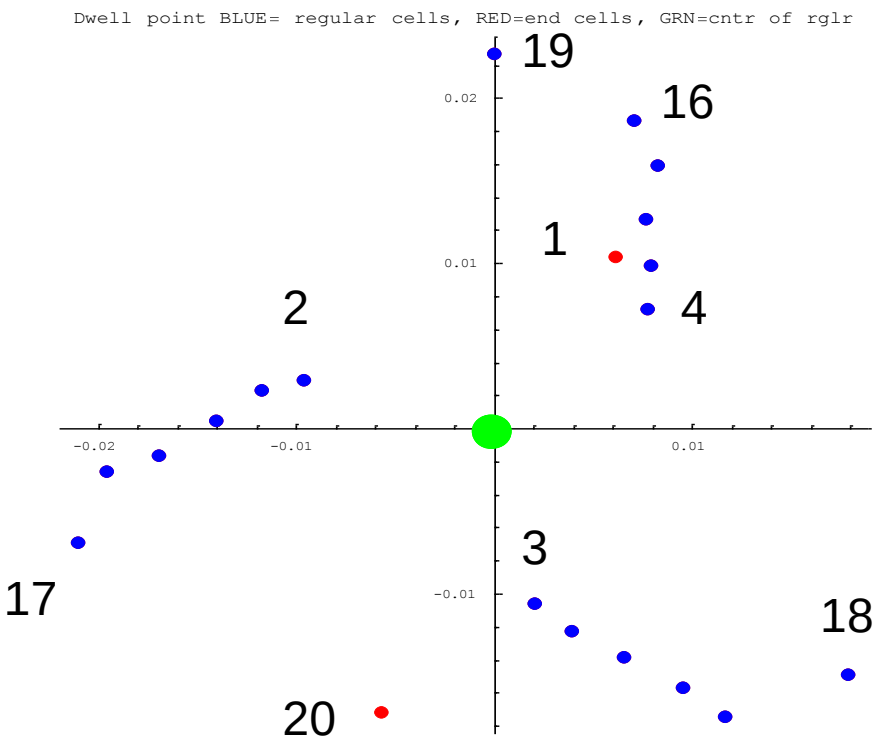


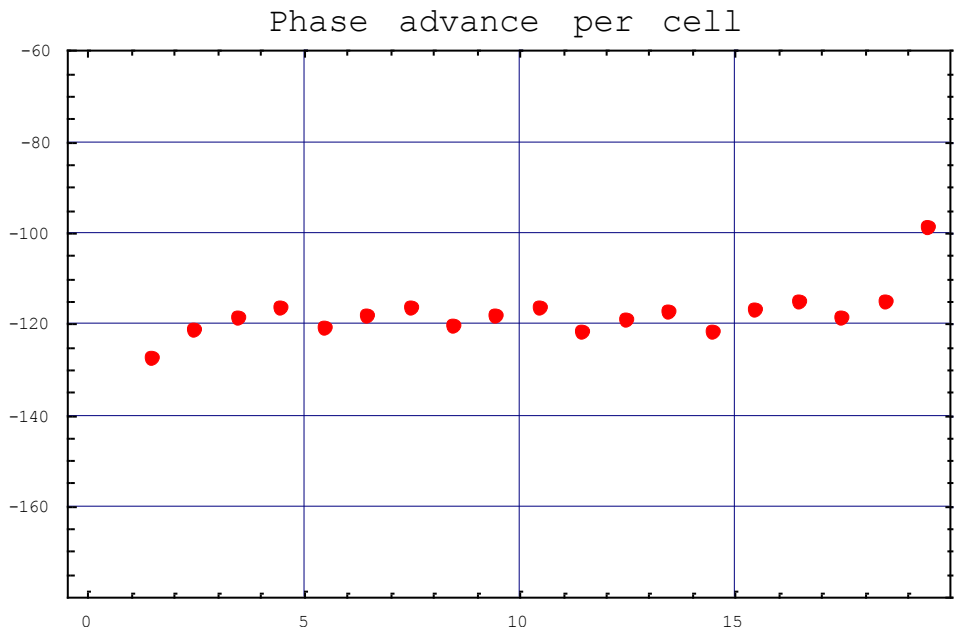
Average phase advance = 124 deg/cell

dF ~ (4/120)*11424*0.0138~ (11424 – 5.4) ~ 11418.6 MHz

vg/c=0.0138 is the value which makes both results measured at 11424 and 11416 the same with each other.

Meas. At 11416MHz, 20.3degC



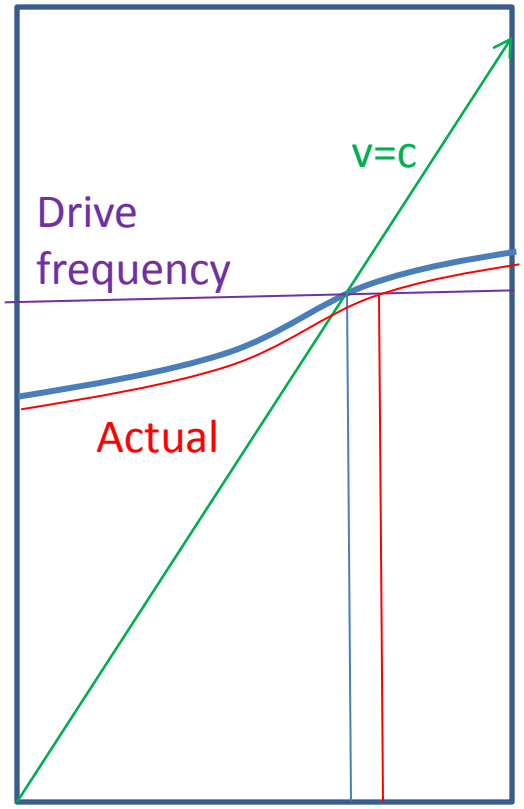


Average phase advance per cell
-118.086 degrees / cell

Average phase advance = 118.1 deg/cell

dF ~ (1.9/120)*11424*0.0138~ (11416 + 2.6) ~ 11418.6MHz

Frequency results from these two meas.



Measurement at T=21C, H=50%, in air. → Operation at 30C in vacuum makes the resonant frequency +2.0MHz.

The frequency of the present quad #5 at operation becomes 11418.6+2

Freq. = 11420.6MHz with120deg/cell at operation. Should be tuned up by 3.4MHz!

Tuning has started this week.

- To do tuning roughly at the current frequency at 11418.6 MHz before EBW.
- To do tuning accurately at the operation frequency after EBW of cooling connection.

Follow up

- Additional measurement by KEK at 11418.6 MHz for confirmation.
- Further analysis of data by Jim with vg/c and attenuation information.
- Check the frequency after EBW of cooling connection.
- Anything proposed.