5TH CLABIO
LATIN AMERICAN BIOIMPEDANCE
FLORIANOPOLIS – BRAZIL - 2024

CN0565 – Multichannel Bipolar Impedancemeter Evaluation

Dr. Ing. Antonio Dell'Osa and Msc. Gerardo Ames Lastra
Laboratorio de Electrónica Aplicada y Biomedicina – UNTDF
Argentina

ABEE-SC

CREA-SC
Conselho Regional de Engenharia e Agronomia de Santa Catarina

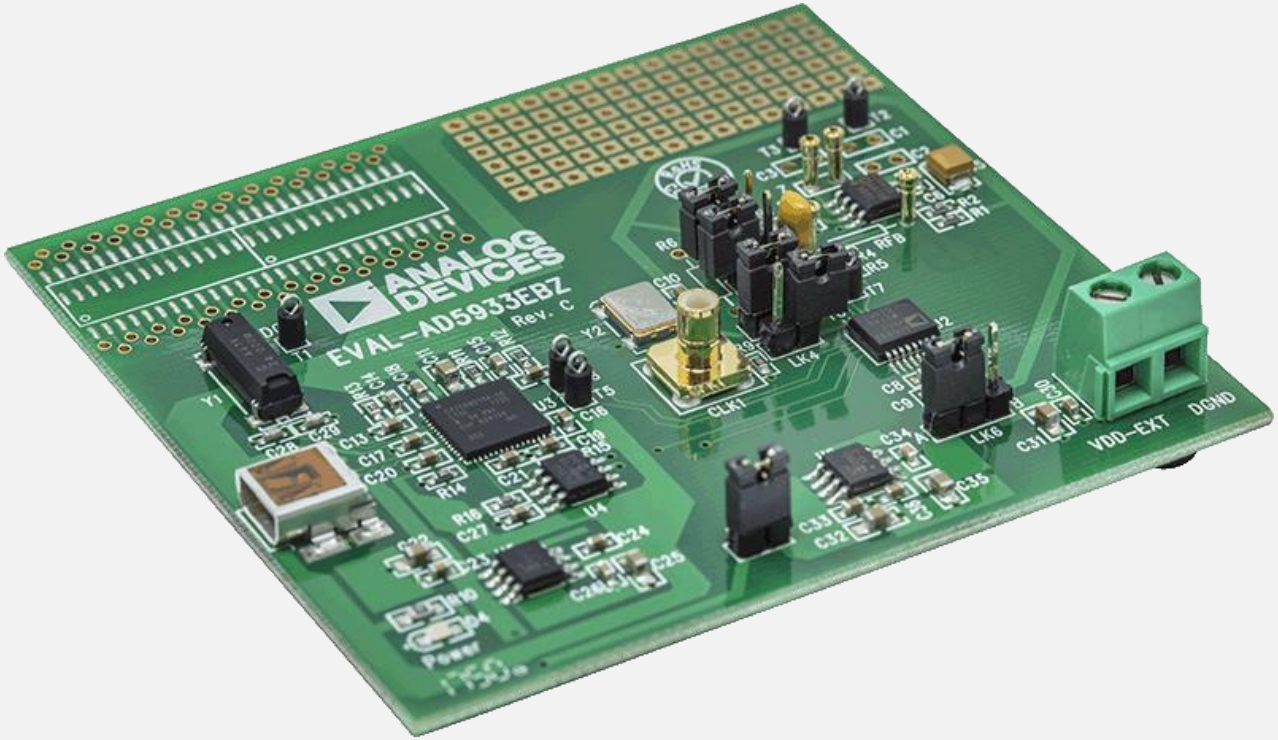
mútua SC
Caixa de Assistência dos Profissionais do Crea

scio spec
scientific instruments

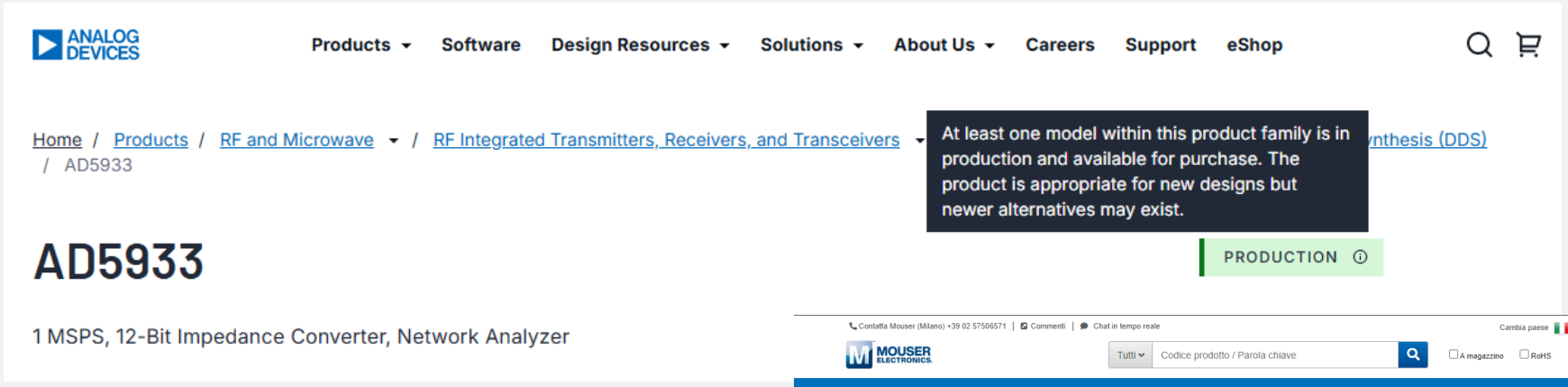
UNIVERSITY OF OSLO

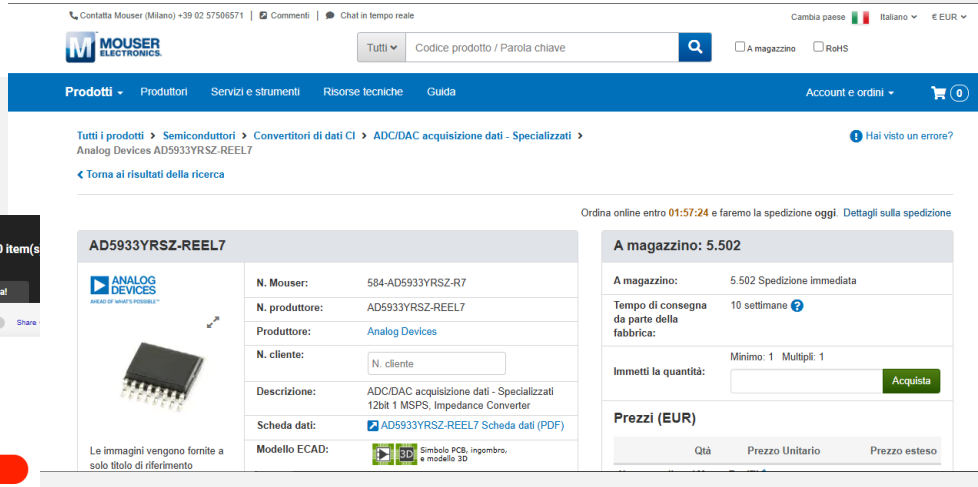
UDESC
UNIVERSIDADE DO ESTADO DE SANTA CATARINA

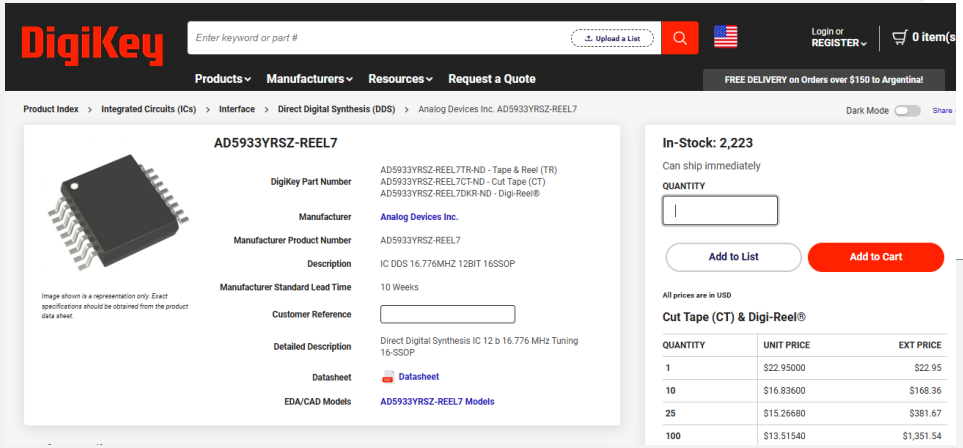
Introduction



Introduction







UDESC

5TH CLABIO LATIN AMERICAN BIOIMPEDANCE FLORIANÓPOLIS – BRAZIL – 2024

ABEE-SC

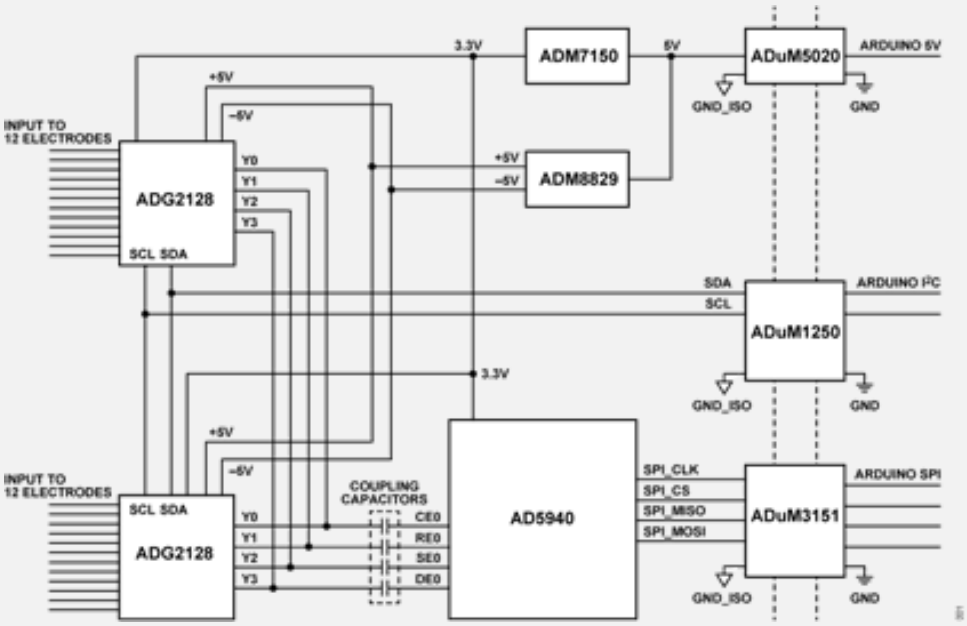
CREA-SC Conselho Regional de Engenharia e Agronomia de Santa Catarina

mutua sc Caixa de Assistência dos Profissionais do Crea

scio spec scientific instruments

UNIVERSITY OF OSLO

Introduction

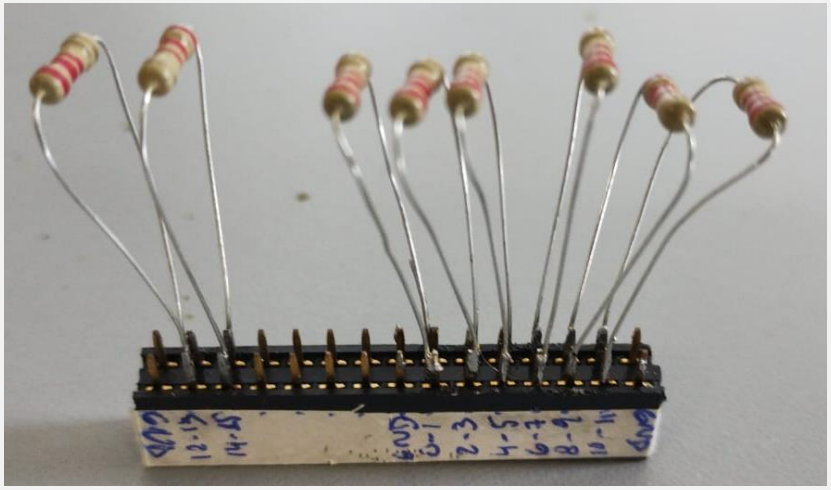


Introduction

The objective of this work is to evaluate the traceability, precision, and accuracy of the bipolar measurements taken with the CN0565 as a multichannel bipolar device. Measurements taken with the AD5933EBZ board on the same resistor values were used as the gold standard.

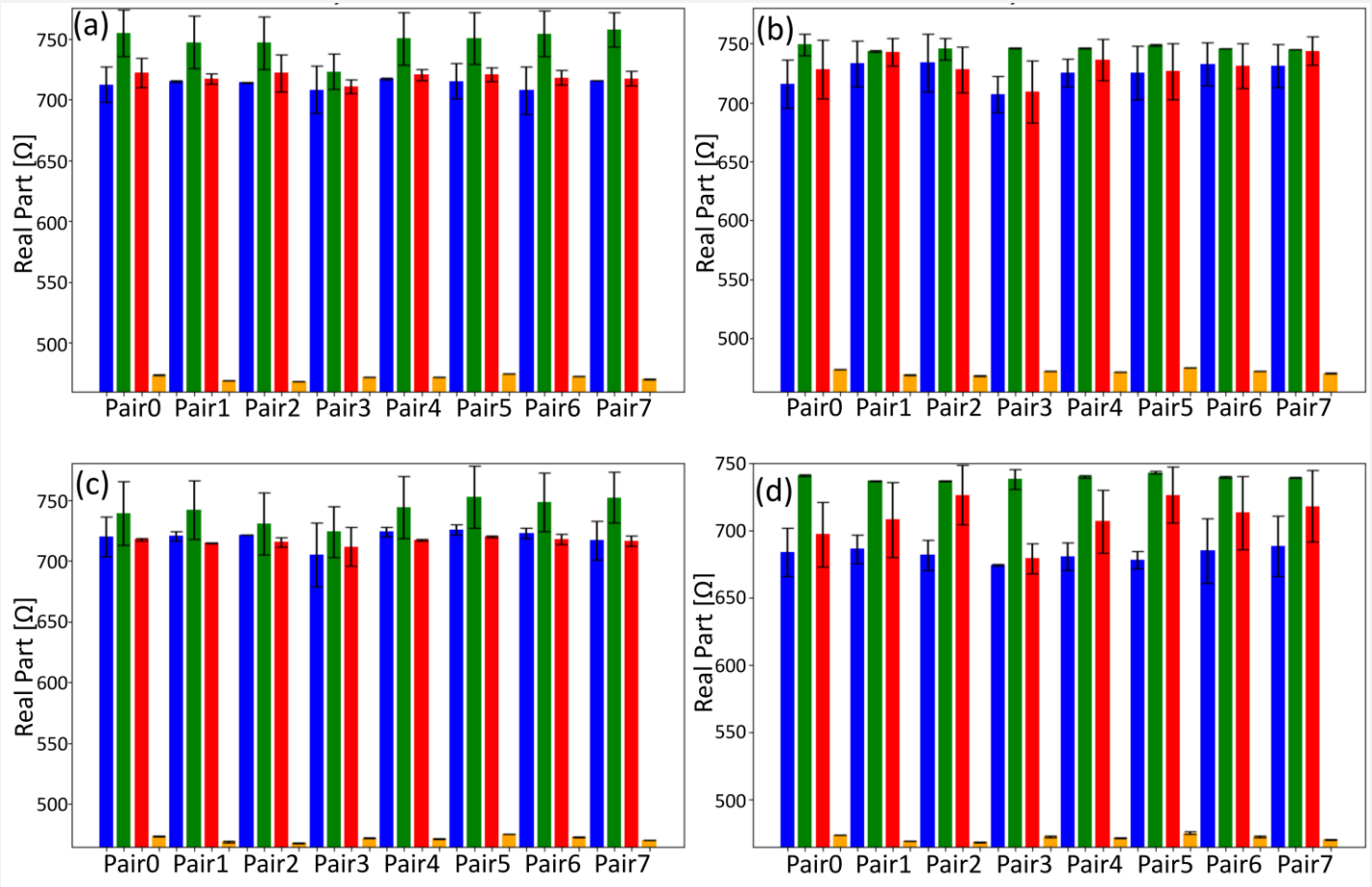
Methodology

- The selected commercial values were: 470 Ω, 680 Ω, 1000 Ω, and 2200 Ω.



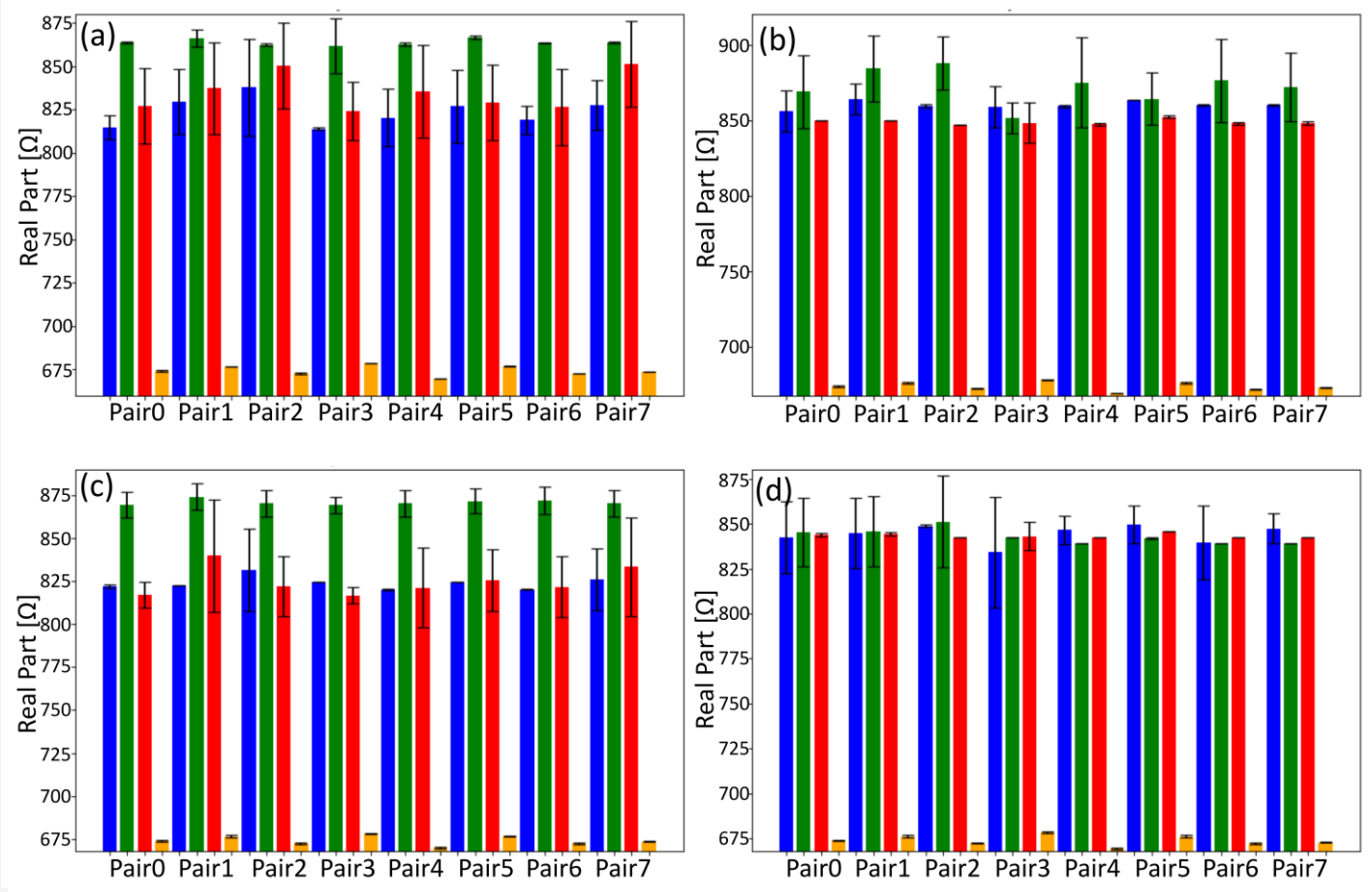
- First, each resistor in each array was measured using the AD5933EBZ board. Each resistor was measured three times.
- Second, the resistor array was placed on the multichannel output of the CN0565, and sequential measurements of each element in the array were taken. Each sequential measurement of each array element was repeated five times.

Results



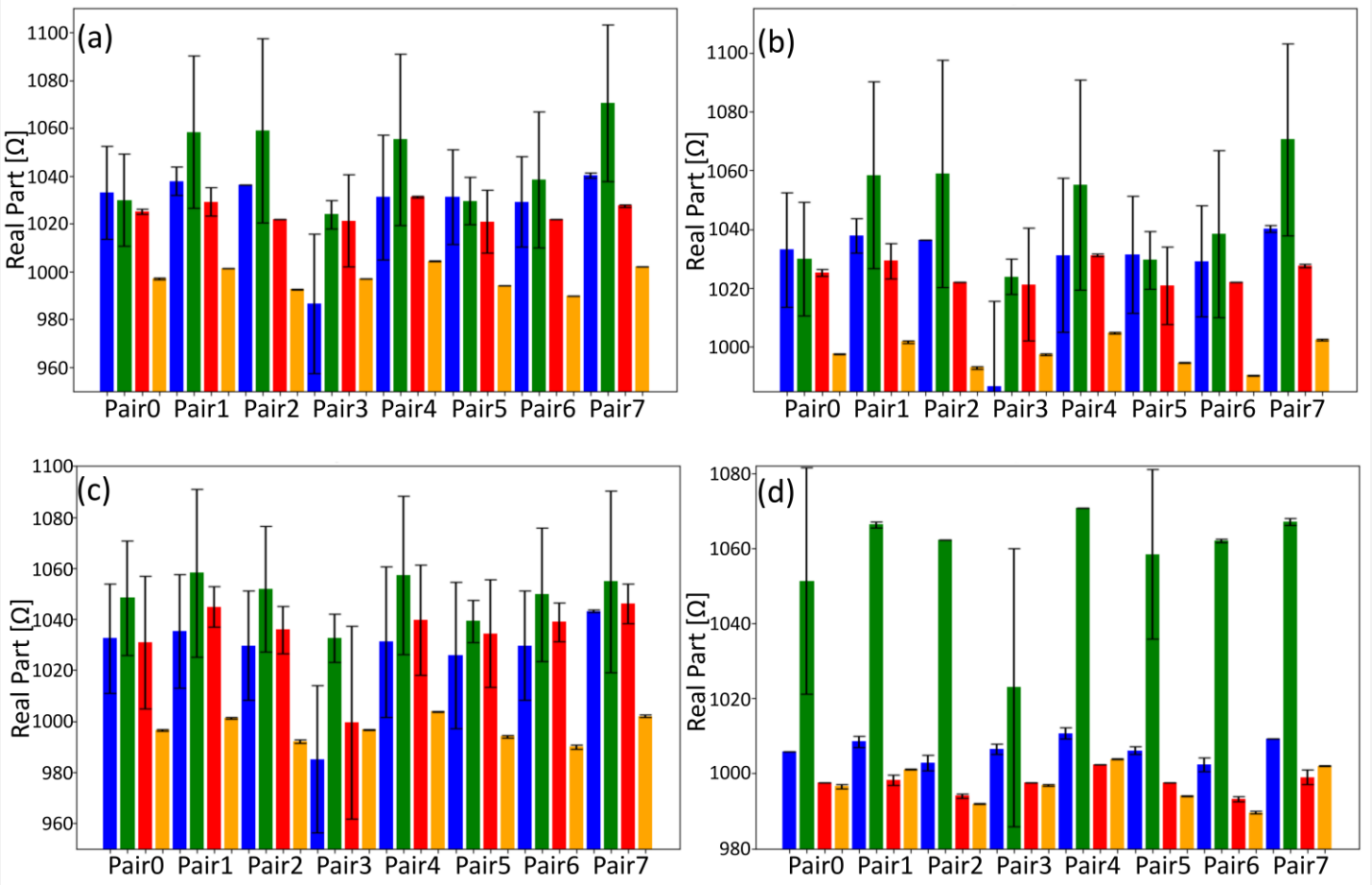
Measurements on 470 Ω resistor for (a) 5 kHz, (b) 10 kHz, (c) 50 kHz and (d) 75 kHz.

Results



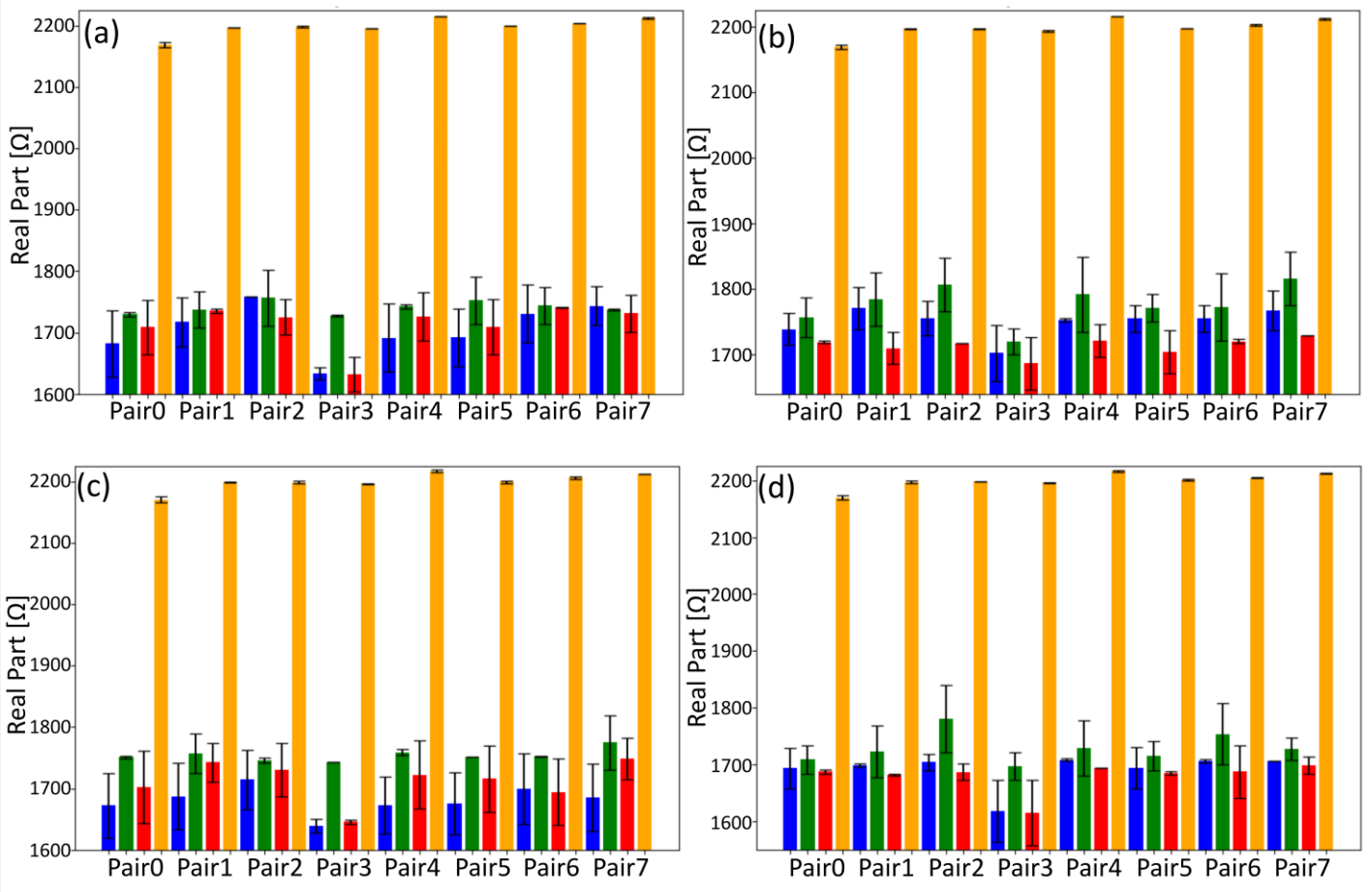
Measurements on 680 Ω resistor for (a) 5 kHz, (b) 10 kHz, (c) 50 kHz and (d) 75 kHz.

Results



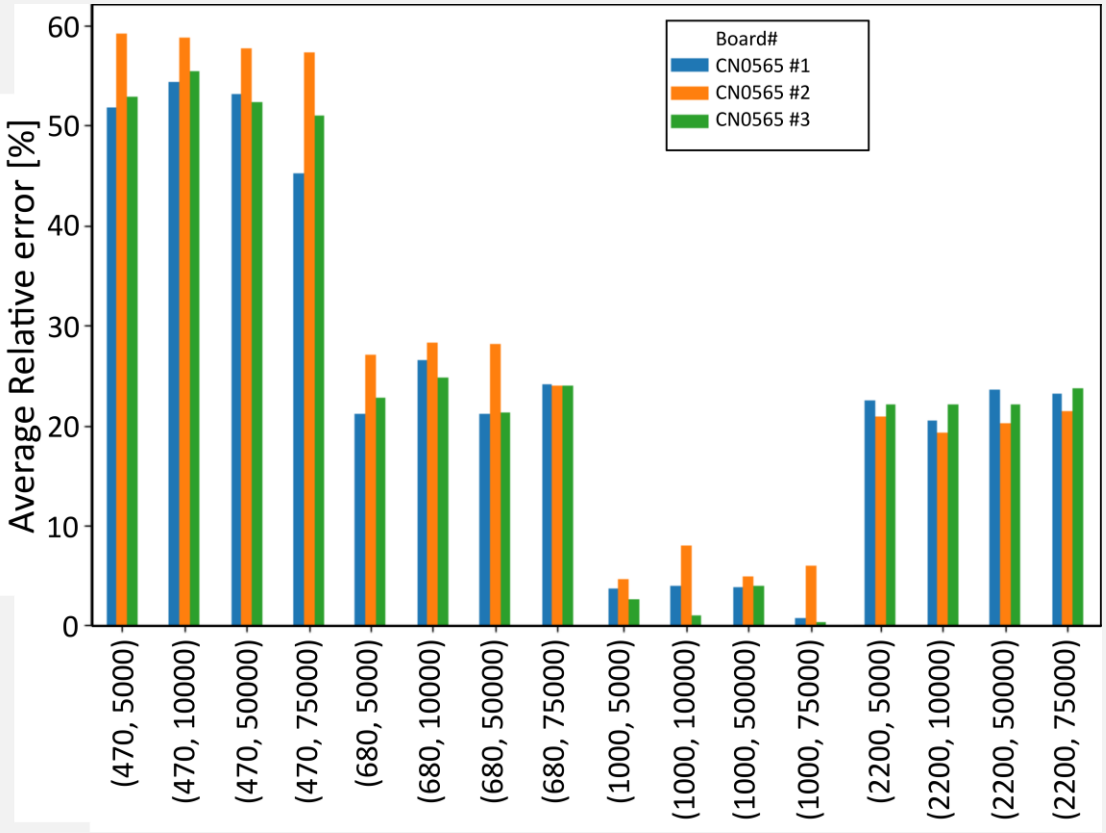
Measurements on 1 kΩ resistor for (a) 5 kHz, (b) 10 kHz, (c) 50 kHz and (d) 75 kHz.

Results



Measurements on 2,2 kΩ resistor for (a) 5 kHz, (b) 10 kHz, (c) 50 kHz and (d) 75 kHz.

Results



Traceability analysis: Average relative error per board: on the x-axis (resistance rating, measurement frequency)

Nominal value	Mean	SD	CV [%]
470	0.534	0.148	27.70
680	0.249	0.102	40.85
1000	0.032	0.090	285.45
2200	0.220	0.099	45.09

Nominal Error for each resistor between the mean and standard deviation (SD) of all measurements between AD5933EBZ measurements. CV: variation coefficient.

Discussion

- Repeated measurements caused a communication failure after 25 readings, likely due to insufficient memory management in the AD5940, resolved only by resetting the ADICUP3029.

- CN0565 board's accuracy depends on its fixed 1 kΩ calibration resistor (Rcal).

- Other values exhibited significant errors due to suboptimal calibration and system limitations.

Conclusion

- CN0565 board is limited for its fixed Rcal=1kohm and for its GUI based on Python.

- In this context, CN0565 is not a good option for multichannel bipolar measurements in “plug and play mode”.

- We couldn’t study the “matrix switch” noise because the problem is measurement stage.

Acknowledgments

- Professor Marco Zennaro (STI Unit, ICTP)
- Italian Embassy in Buenos Aires
- Training and Research in Italian Laboratories (TRIL) at the International Centre for Theoretical Physics (ICTP)

5TH CLABIO
LATIN AMERICAN BIOIMPEDANCE
FLORIANOPOLIS – BRAZIL - 2024

Thank you for your attention

UDESC

5TH CLABIO LATIN AMERICAN BIOIMPEDANCE FLORIANOPOLIS – BRAZIL - 2024

UNIVERSITY OF OSLO

CREA-SC
Conselho Regional de Engenharia e Agronomia de Santa Catarina

mútua SC
Caixa de Assistência dos Profissionais do Crea

scio spec
scientific instruments

ABEE-SC