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J.R. Ngankio-Njila, D.-G. Crété, J.-C. Mage, B. Marcilhac, P. Febvre

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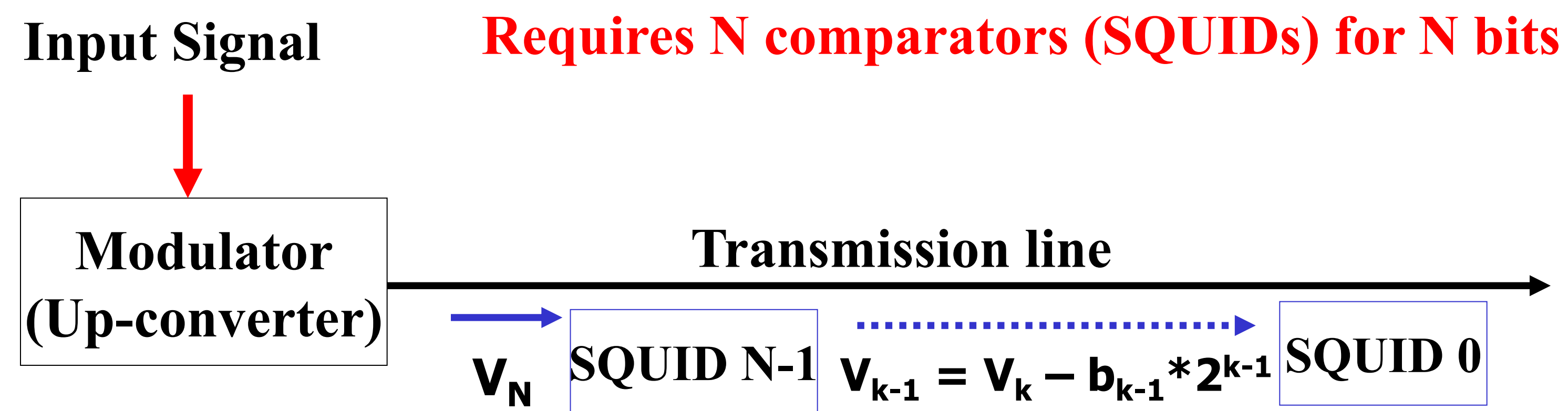
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# Concept of Superconducting Pipe-line A/D Converter

J.R. Ngankio-Njila, D-G. Crété, J-C. Mage, B. Marcilhac and P. Febvre

## CONCEPT



Pipeline architecture with superconducting circuits:

- Uses microwave propagation along a transmission line
- Energy is subtracted from this line by trapping of  $\Phi_0$  in SQUID loop
- A modulator is "sampling" the input signal at very high frequency (carrier at fixed frequency)

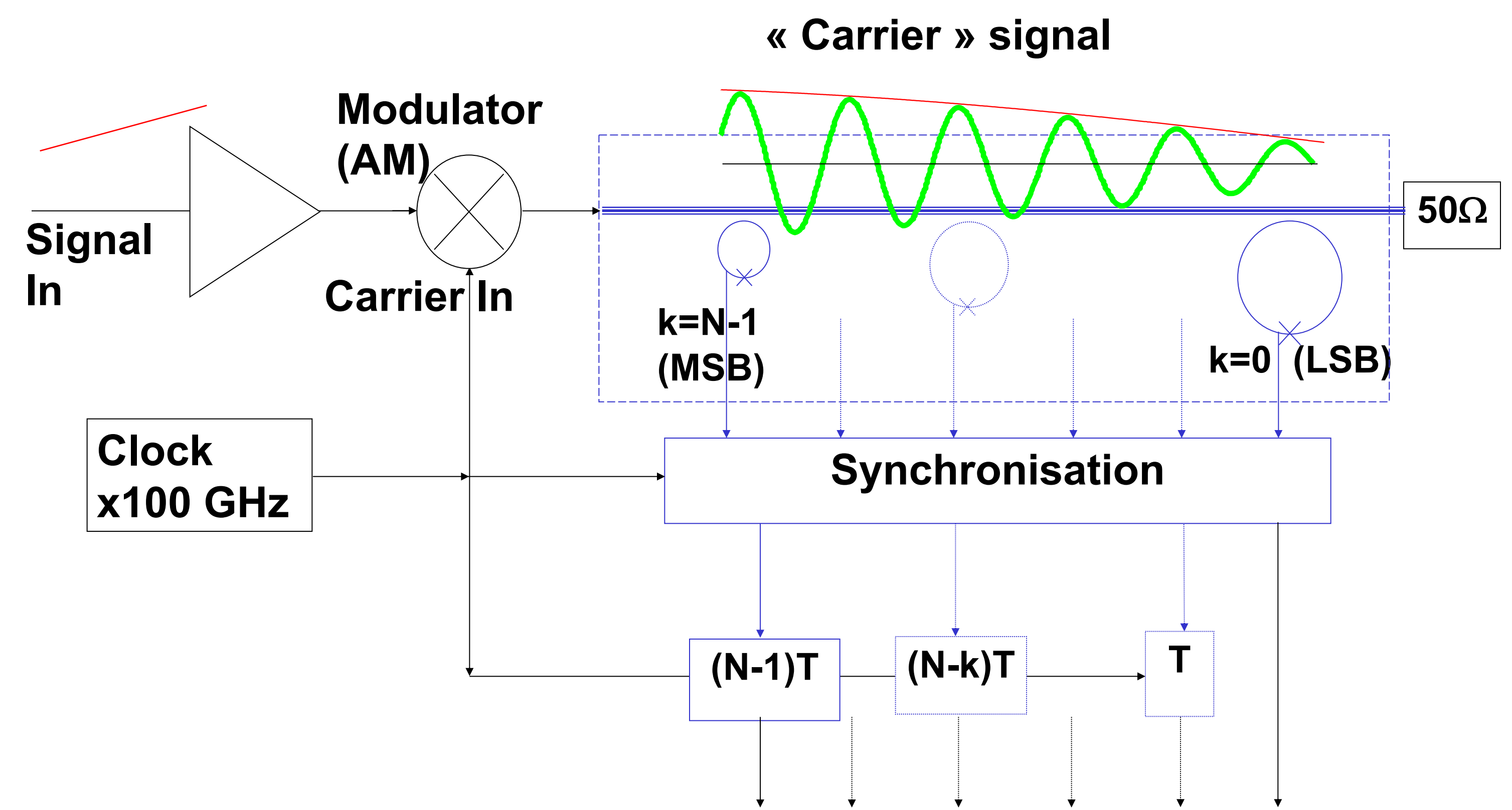
### Advantage:

- High rate conversion possible as overlap occurs.

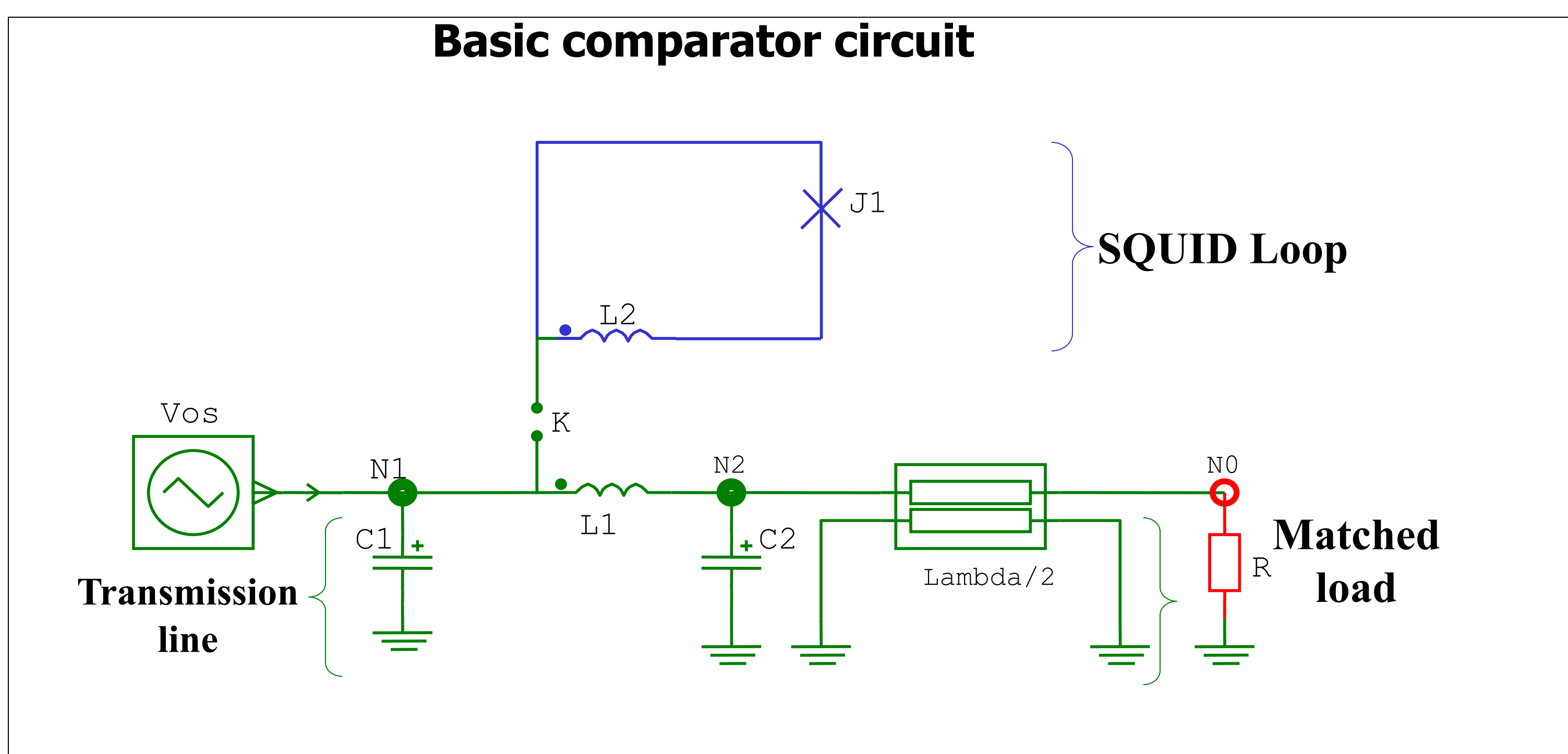
### Issues:

- Up-conversion at high frequency (...100 GHz)
- May require under damped junctions (to reduce dissipation when switching)
- Limited line length for larger bandwidth => limited number of bits

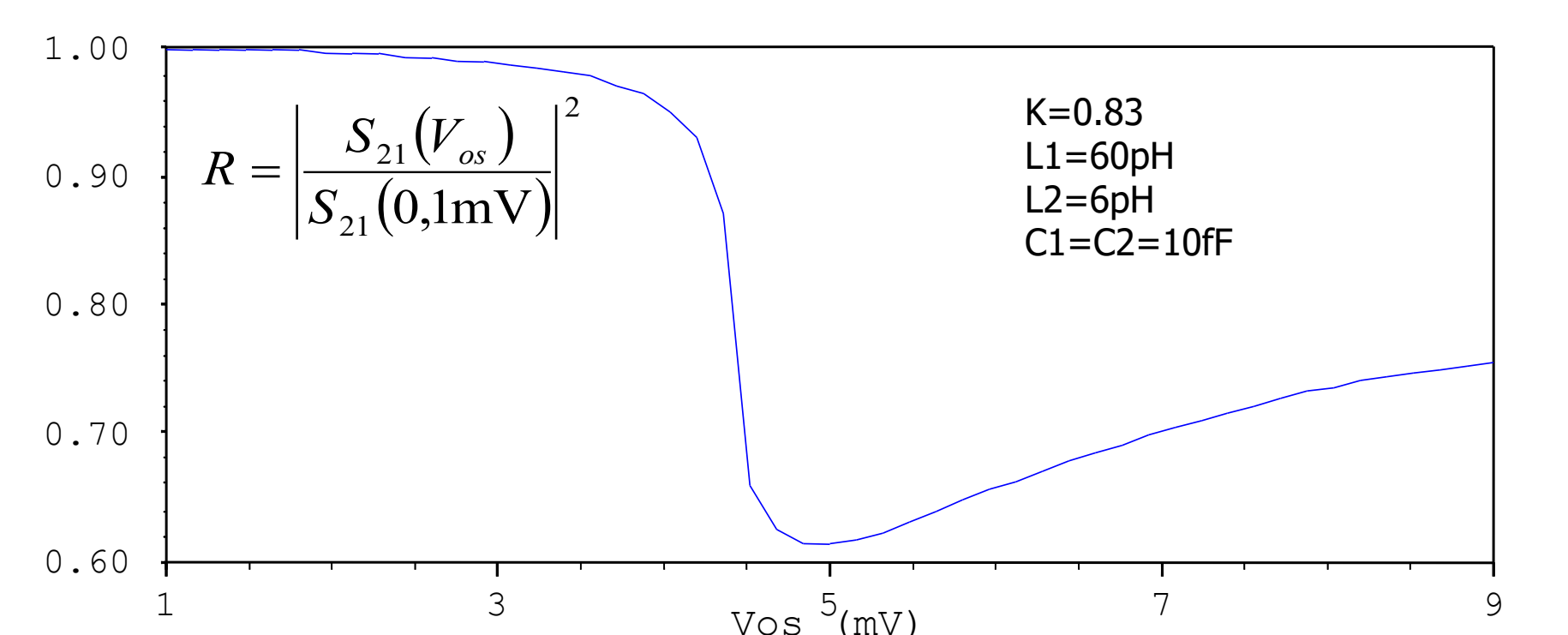
## ARCHITECTURE



## EVALUATION OF THE FIRST COMPARATOR OF THE CONVERTER



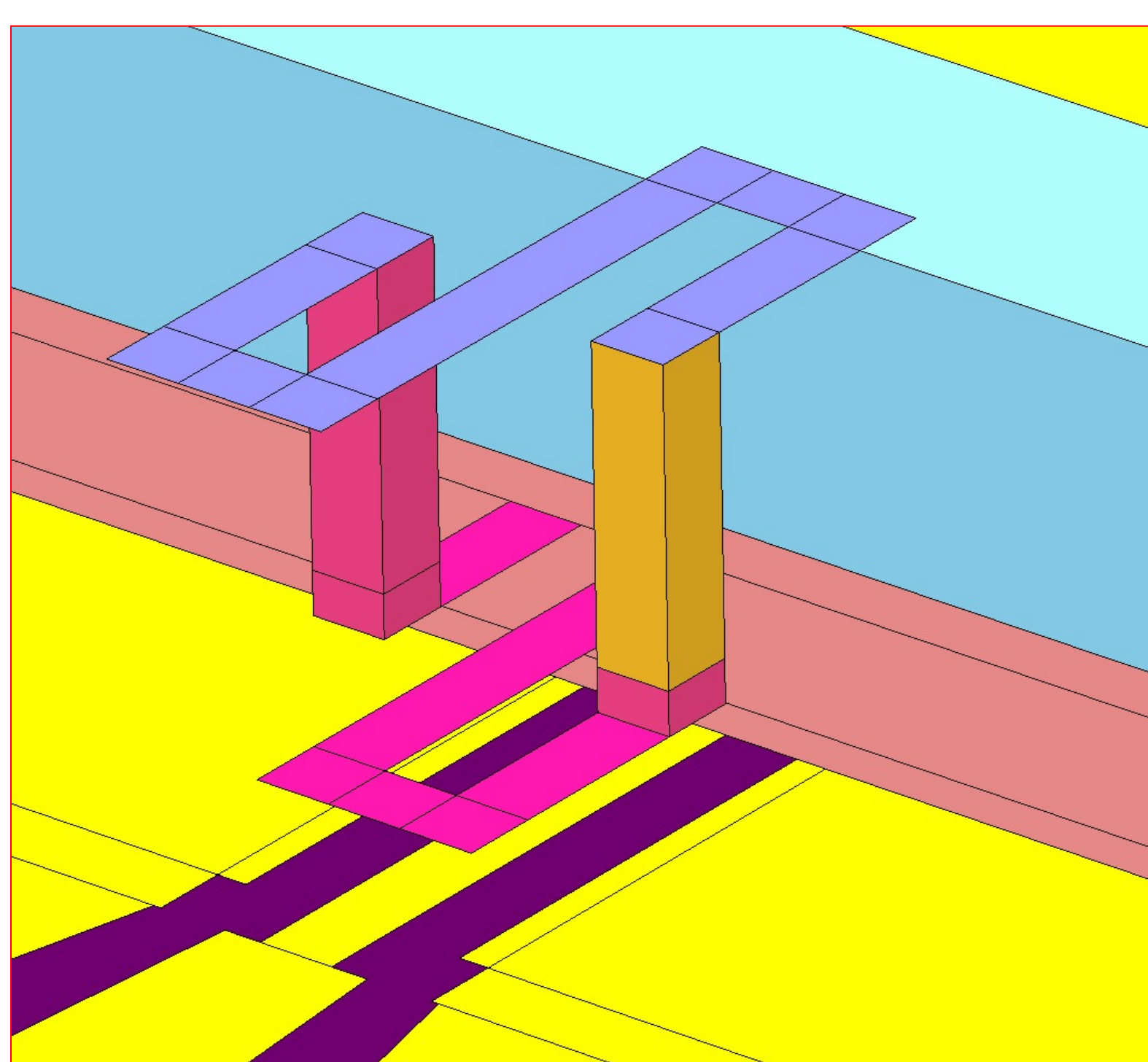
### Power transmission coefficient ratio



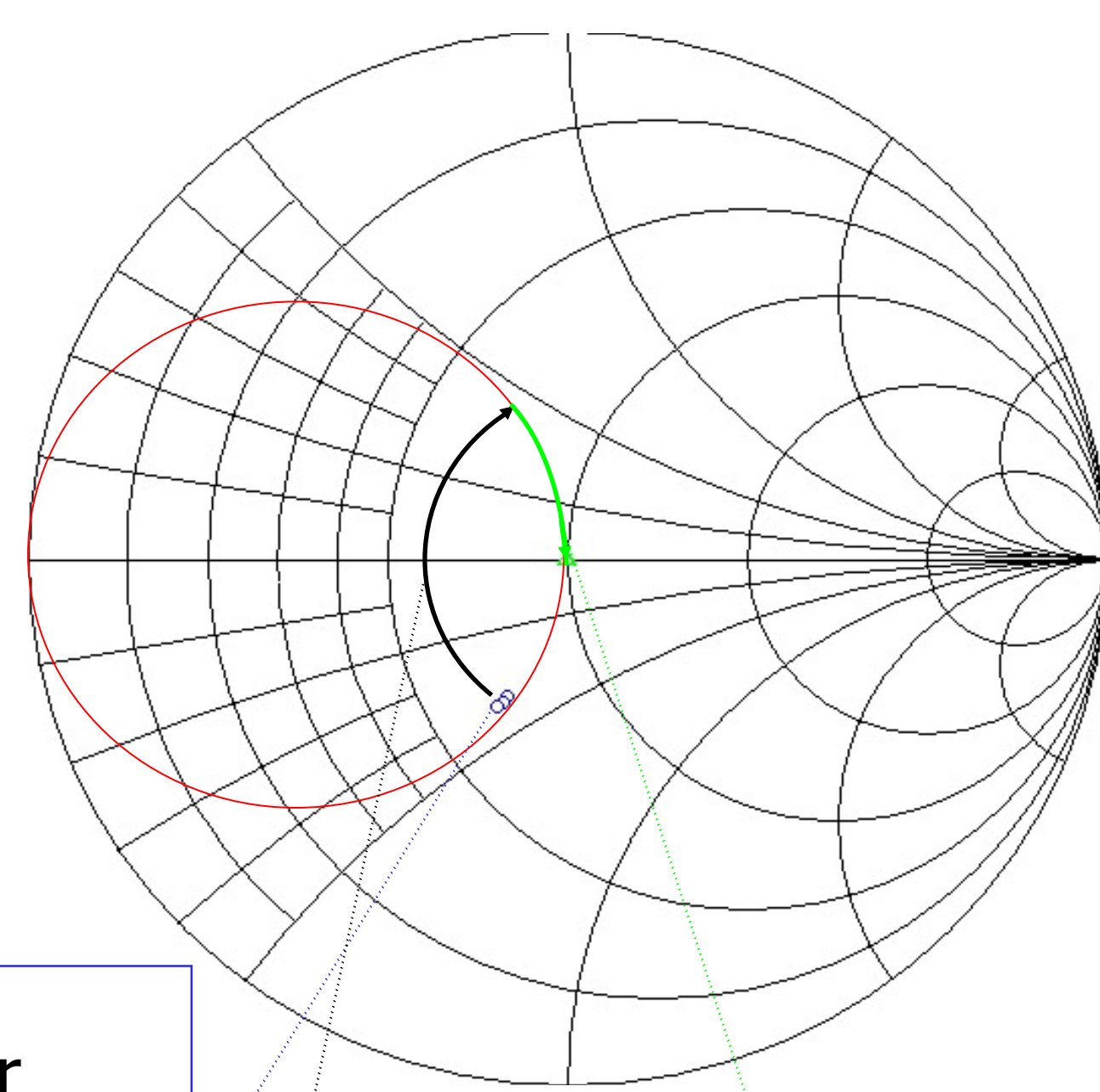
Subtraction effect @  $V_{0s} > 4.5$  mV

## Lay-out of the comparator (and matching circuit) for LTS technology

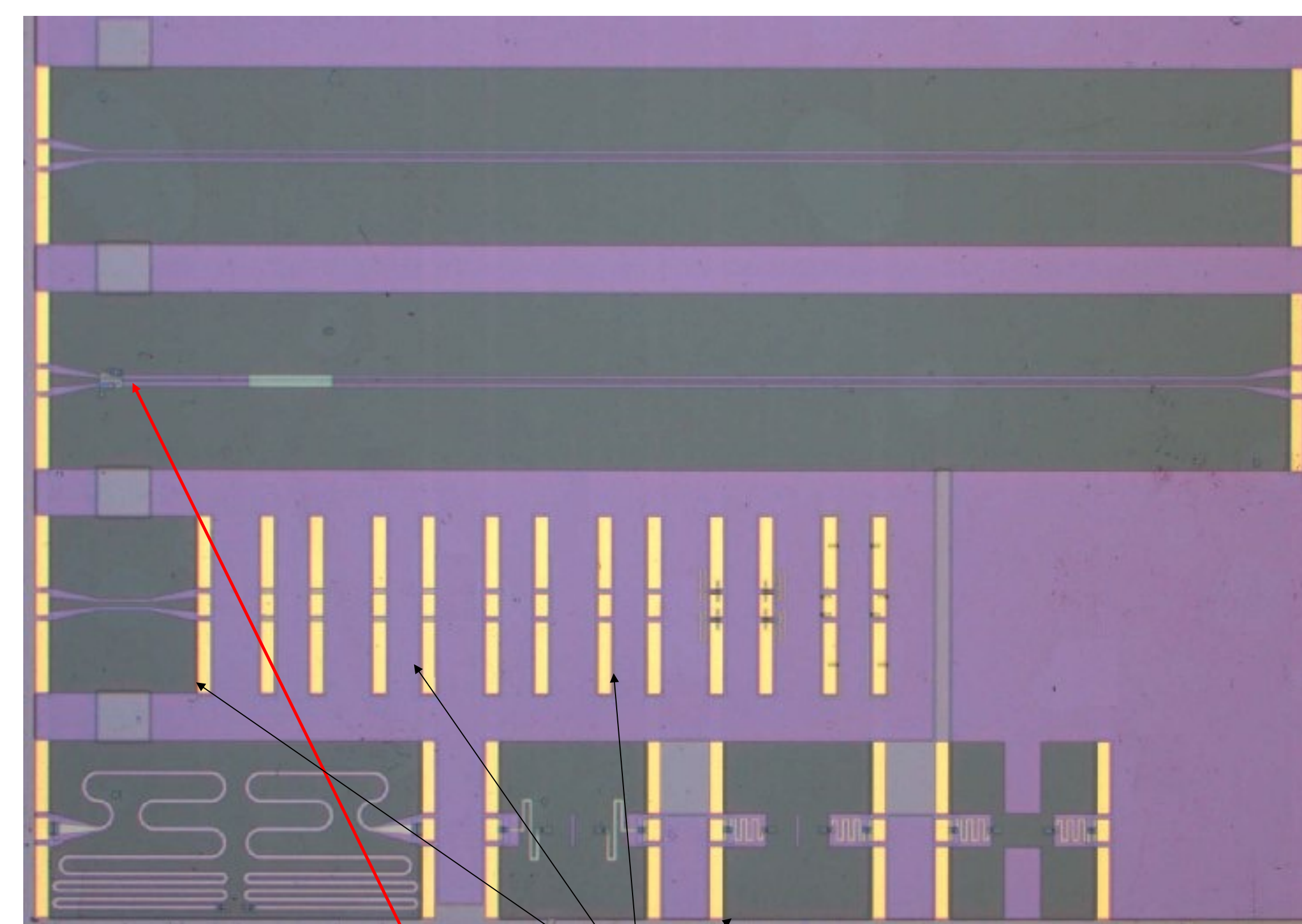
Zoom on the comparator



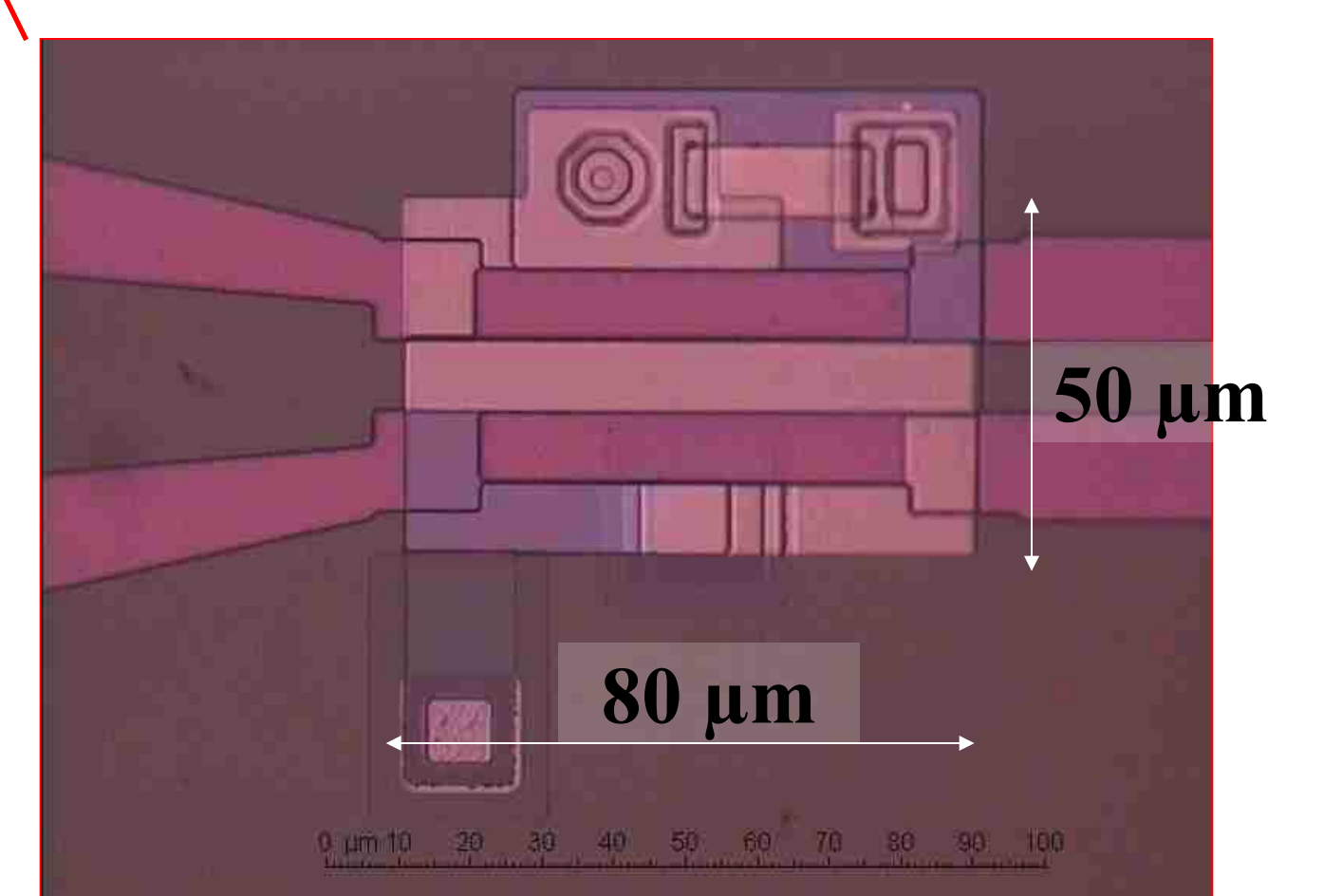
80 $\mu$ m-coplanar transmission line coupled with a « figure of 8 » loop



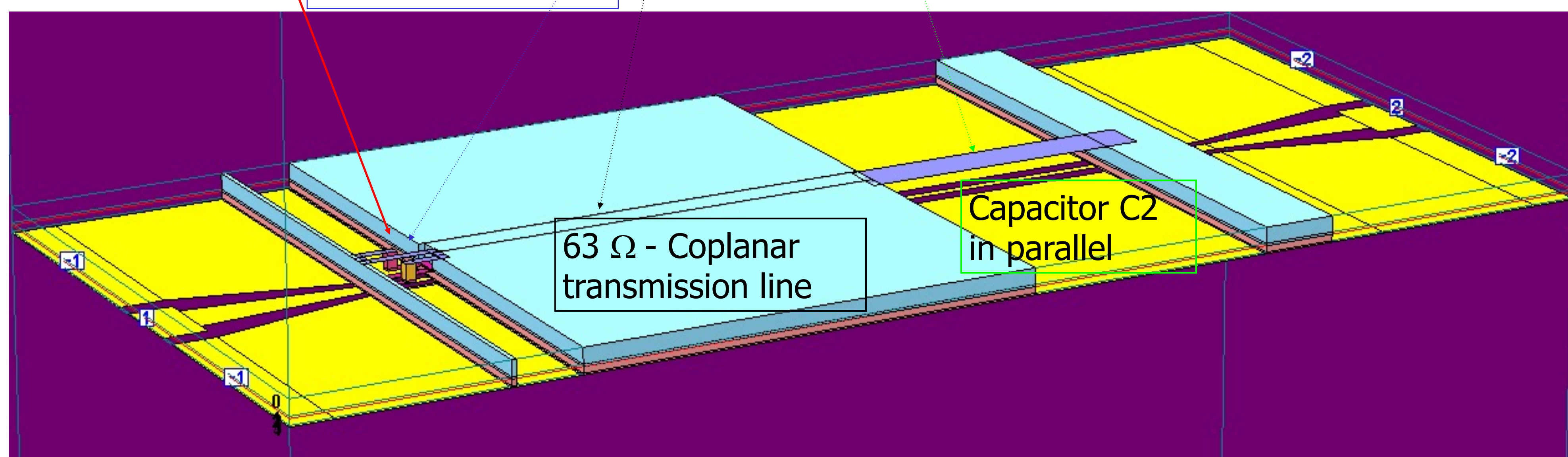
Fabrication by FLUXONICS



Test and calibration circuits



Zoom on the transmission line coupled with SQUID loop



63  $\Omega$  - Coplanar transmission line

Capacitor C2 in parallel

## Perspectives

- Test, measure of circuits at IMEP-LAHC Chambéry.
- Feedback on design + Comparator with its read out circuit
- Cascade comparators  $\rightarrow$  Pipeline ADC.
- Design for HTS device

## Acknowledgements :

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