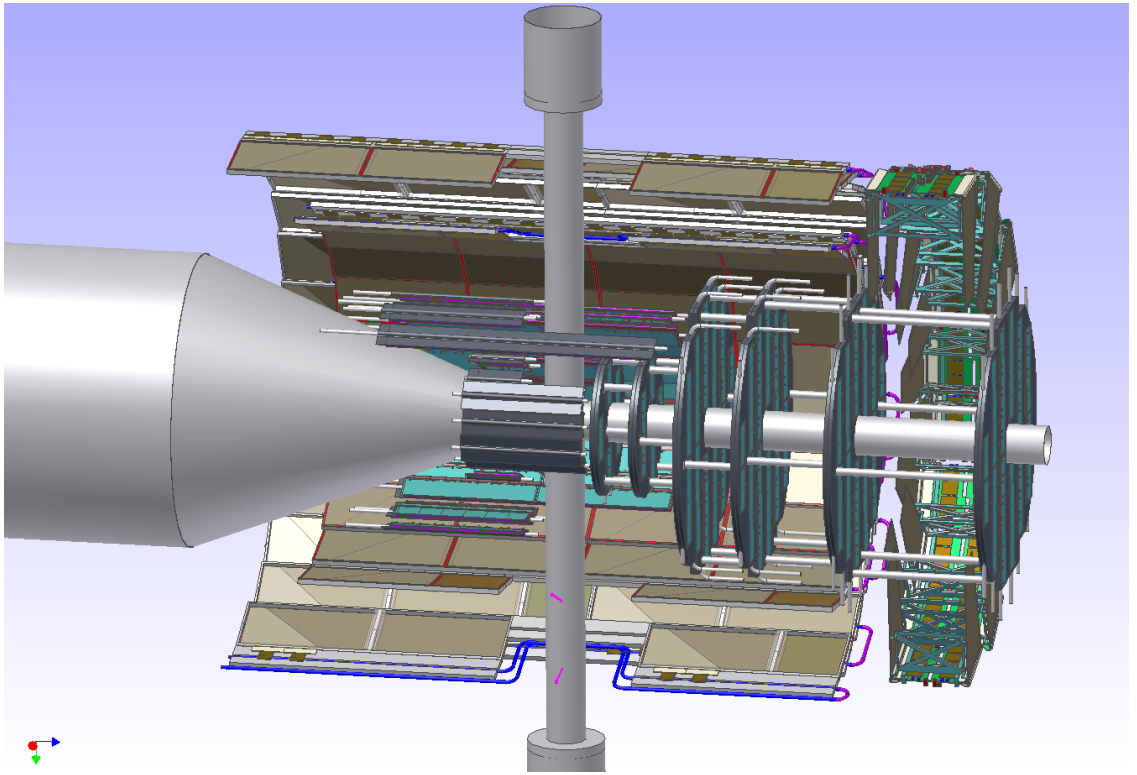
Present activity on cable issues.



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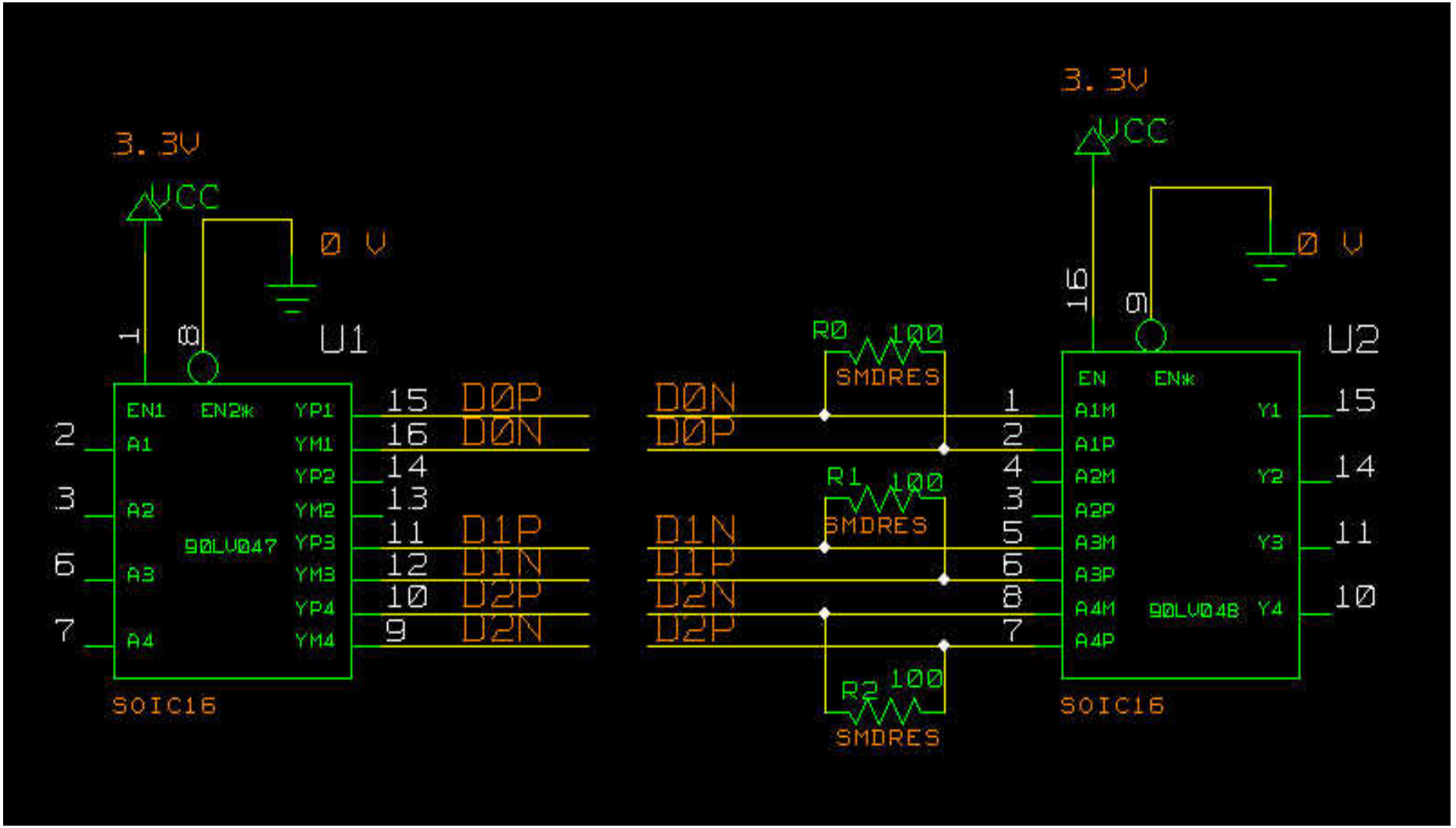
Marco Mignone, Richard Wheadon.
INFN Torino

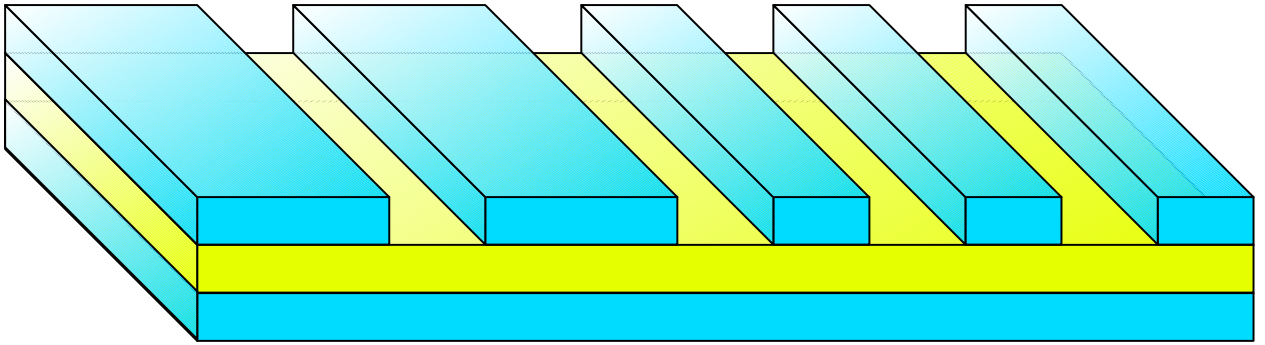
Collaboration Meeting, 06.09 INFN, Torino.

Schematic circuit.



The starting point is the schematic entry, with definition of Ibis model for driver and receiver.

PCB cross section.

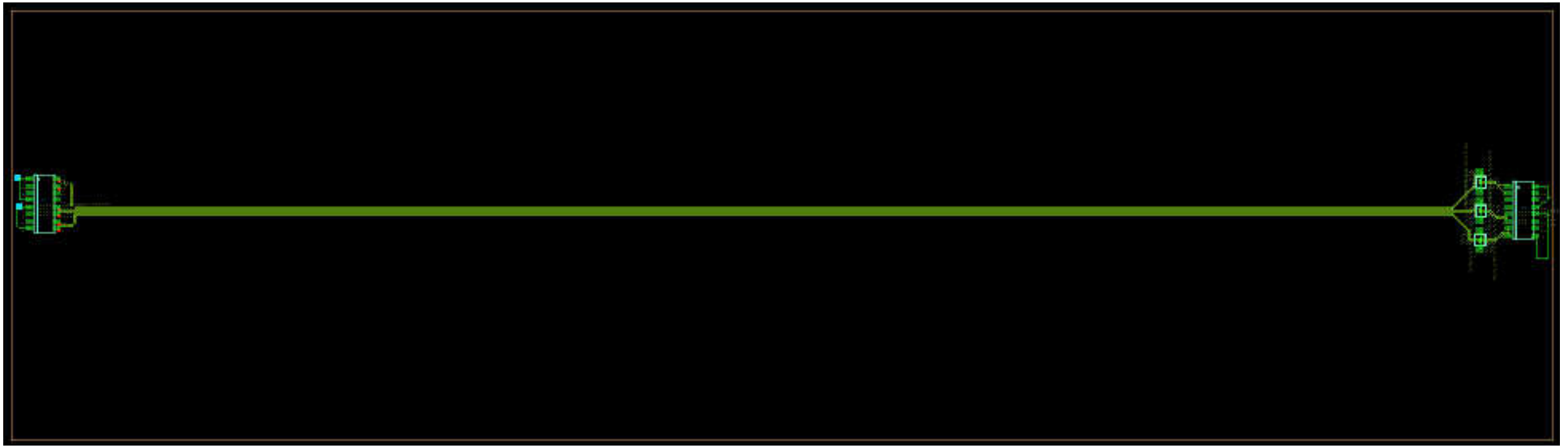


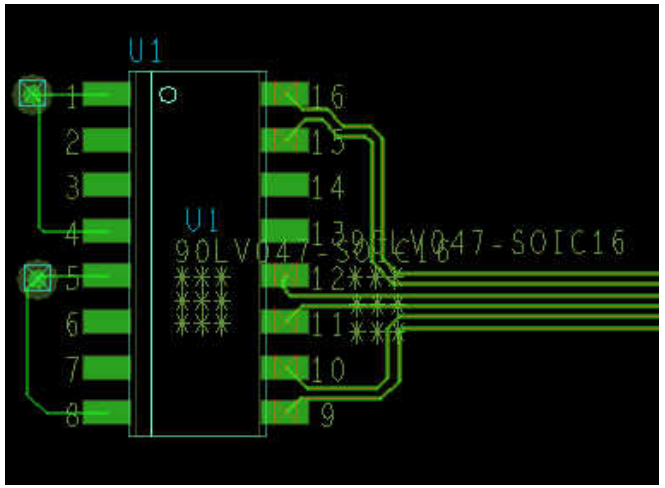
	Subclass Name	Type	Material	Thickness (MIL)	Conductivity (mho/cm)	Dielectric Constant	Loss Tangent	Negative Artwork	Shield	Width (MIL)	Impedance (ohm)
1		SURFACE	AIR			4.500000	0				
2	TOP	CONDUCTOR	ALUMINUM	1.18	350000	4.500000	0	☐		6.0	68.115
3		DIELECTRIC	POLYIMIDE_FILM	5.12	0	3.500000	0				
4	BOTTOM	PLANE	ALUMINUM	0.55	350000	4.500000	0	☐	☒		
5		SURFACE	AIR			4.500000	0				

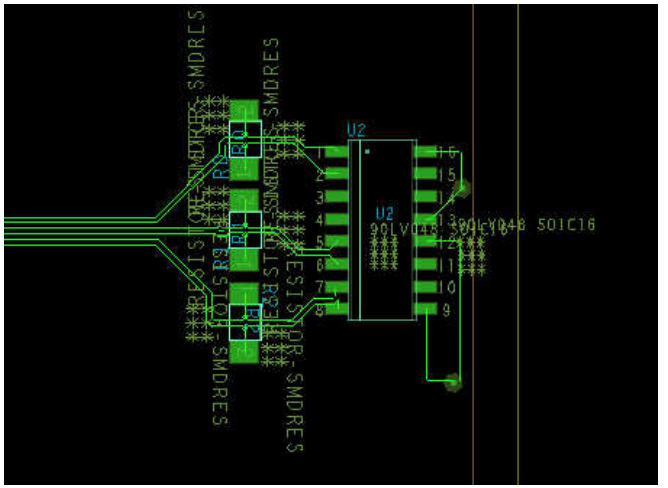
	Subclass Name	Type	Thickness (MIL)	Dielectric Constant	Loss Tangent	Shield	Width (MIL)	Impedance (ohm)	Coupling Type	Spacing (MIL)	DiffZ0 (ohm)
1		SURFACE		4.500000	0						
2	TOP	CONDUCTOR	1.18	4.500000	0		6.0	68.115	EDGE	6.0	114.83
3		DIELECTRIC	5.12	3.500000	0						
4	BOTTOM	PLANE	0.55	4.500000	0	☒					
5		SURFACE		4.500000	0						

Definition of the PCB cross section with geometrical dimensions, and physical properties.

PCB with a layout 0.3m long.

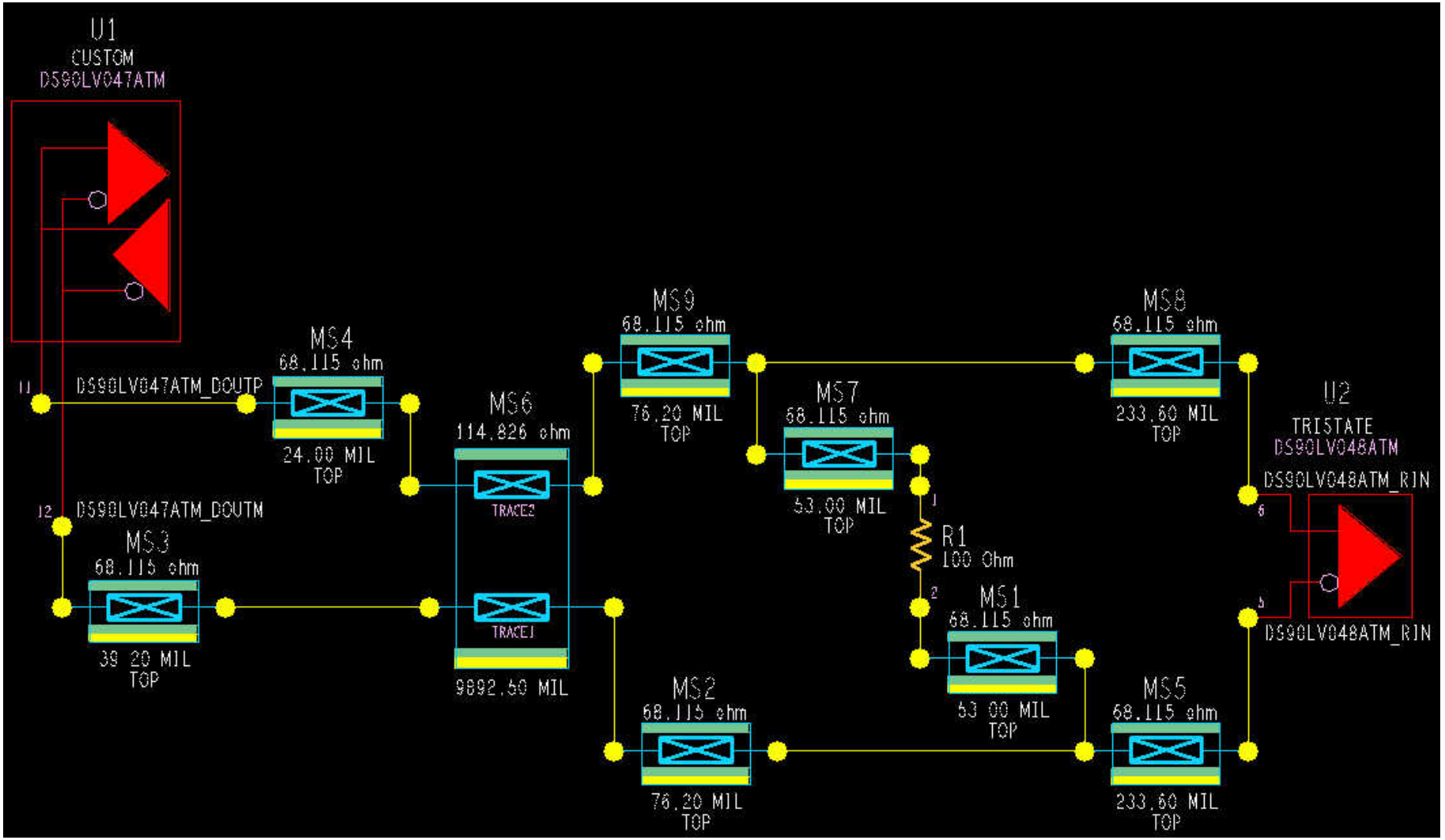






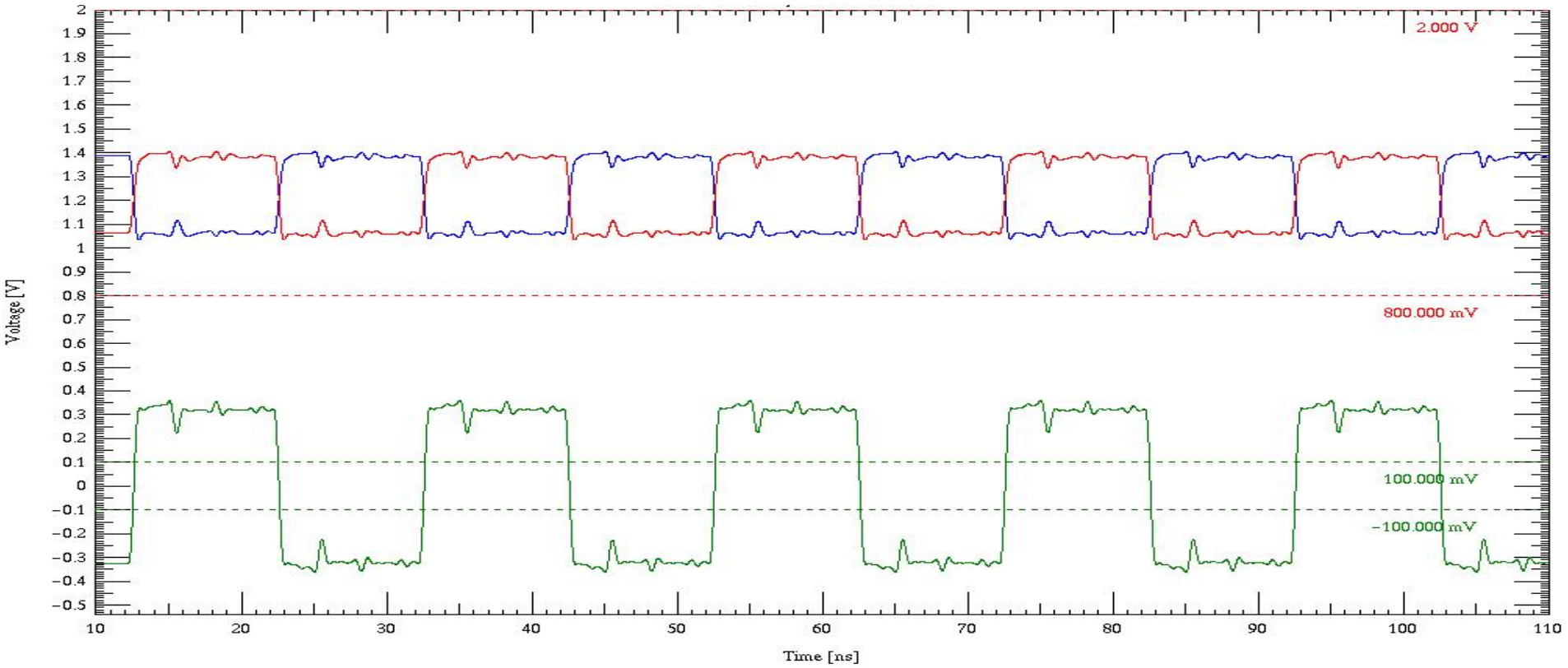
The structure is very similar to an existing cable, to validate simulations with measurements.

Differential pair topology.



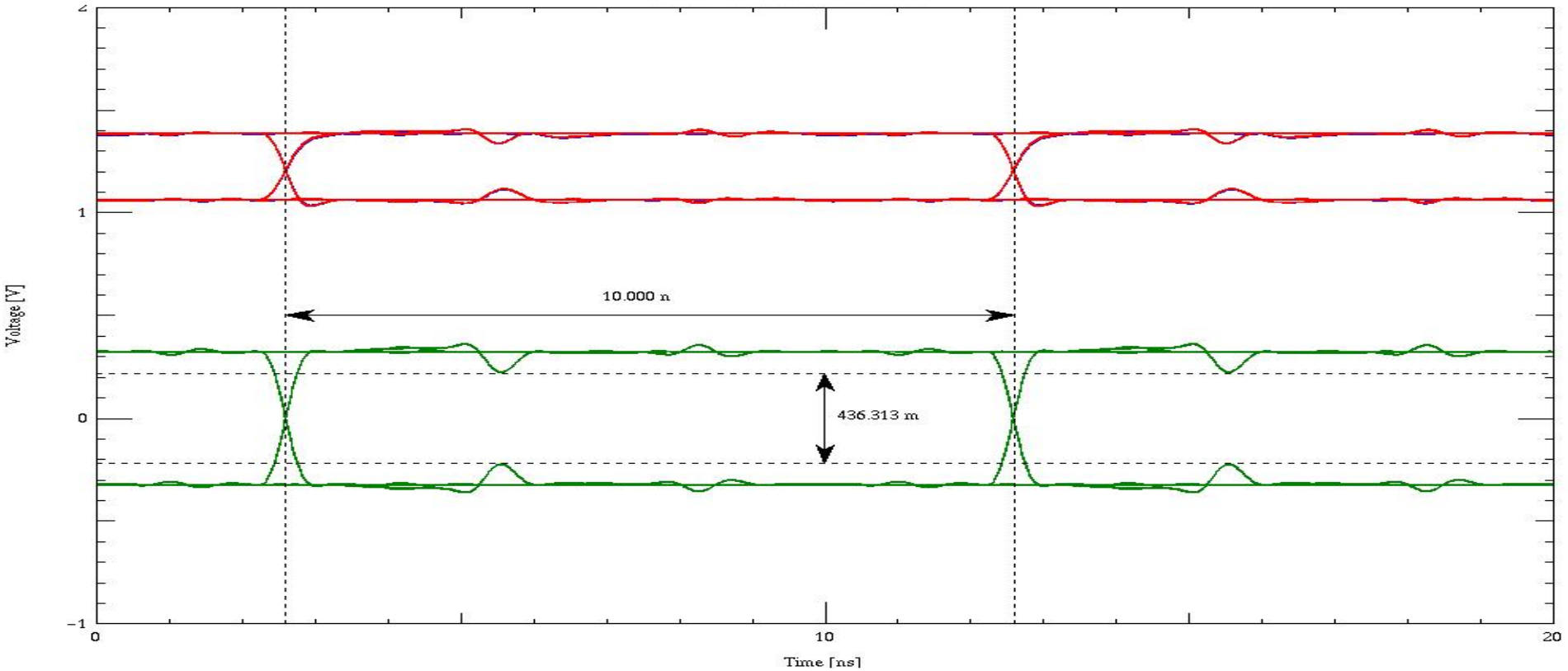
The topology is extracted from the layout, together with the stray parameters coming from the geometry.

Differential signals @bit rate 100Mb/s.



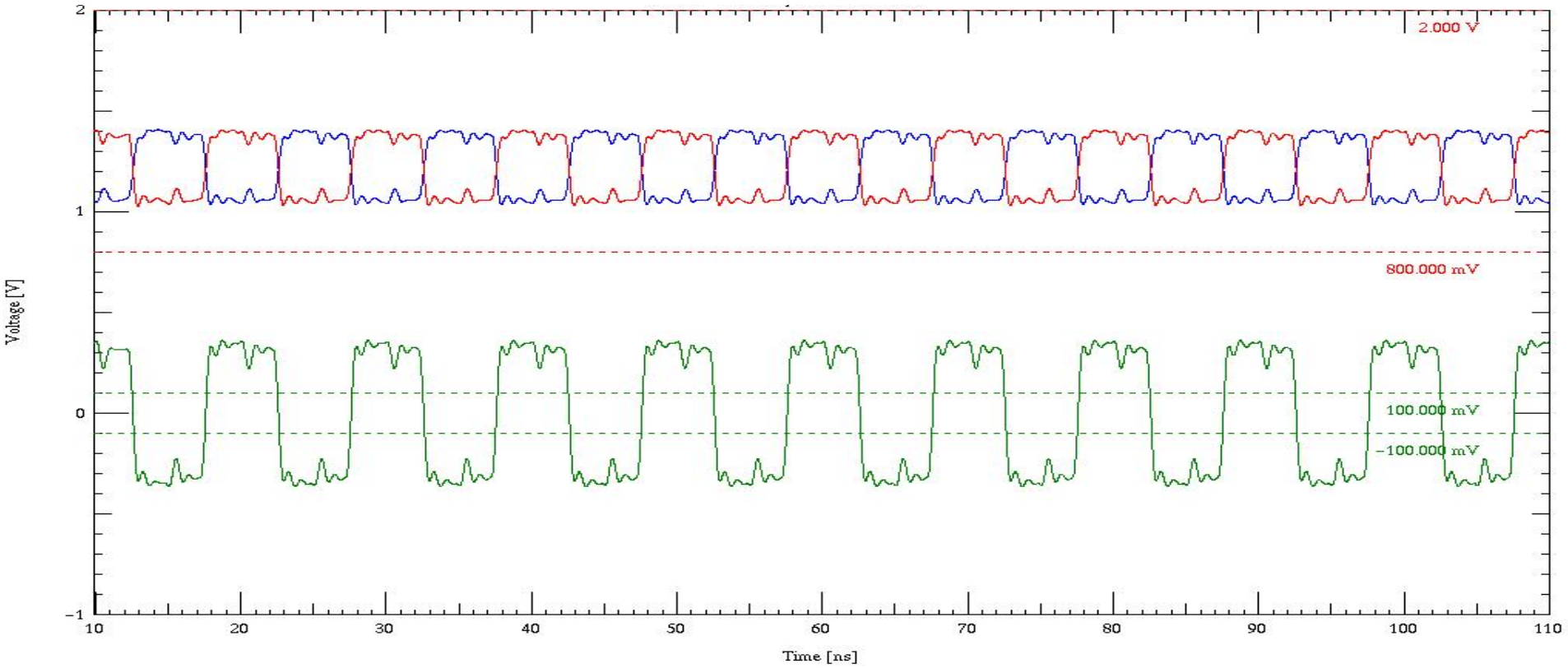
Two phases with 10ns bit time and the reconstructed difference signal, at the cable end after 0.3m.

Eye diagram @length 0.3m, rate 100Mb/s.



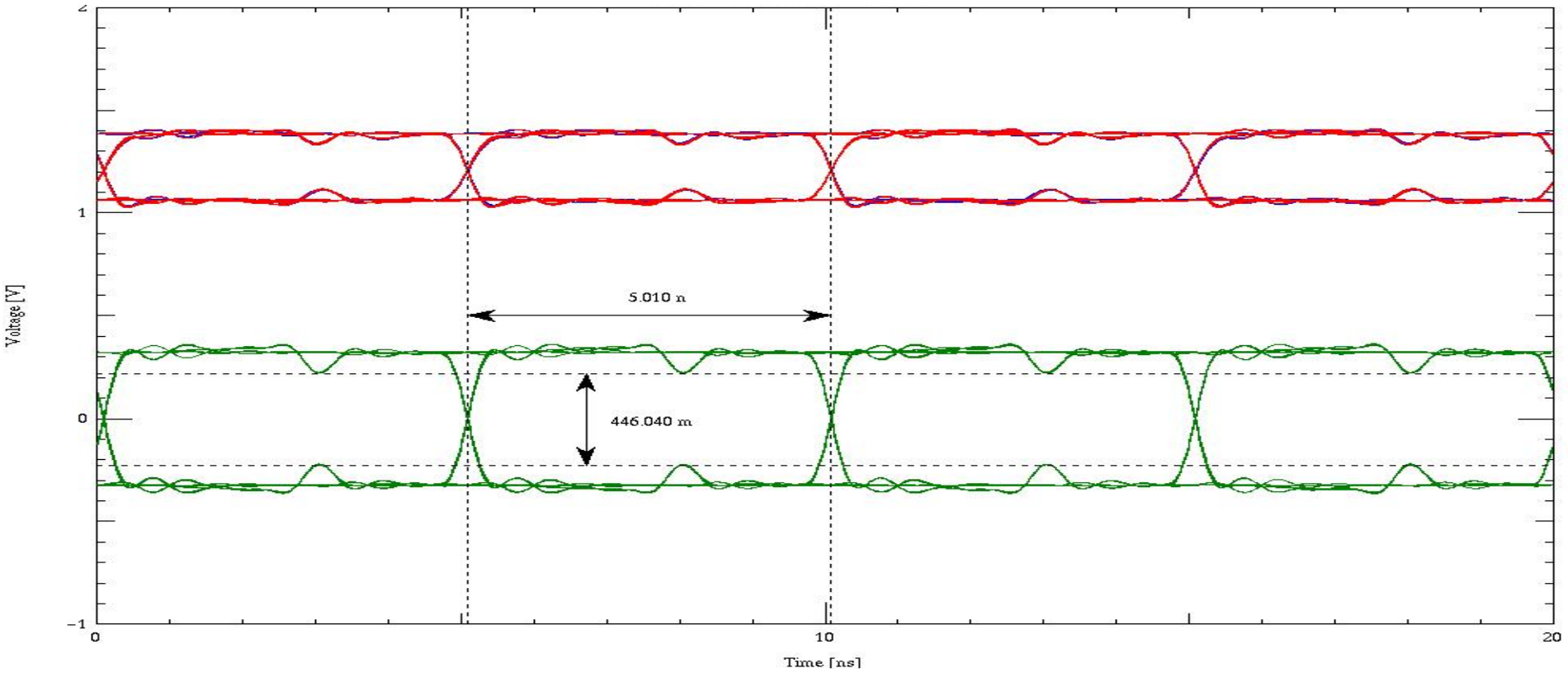
Eye diagram obtained by a random stream of data with 10ns bit time, at the cable end after 0.3m.

Differential signals @bit rate 200Mb/s.



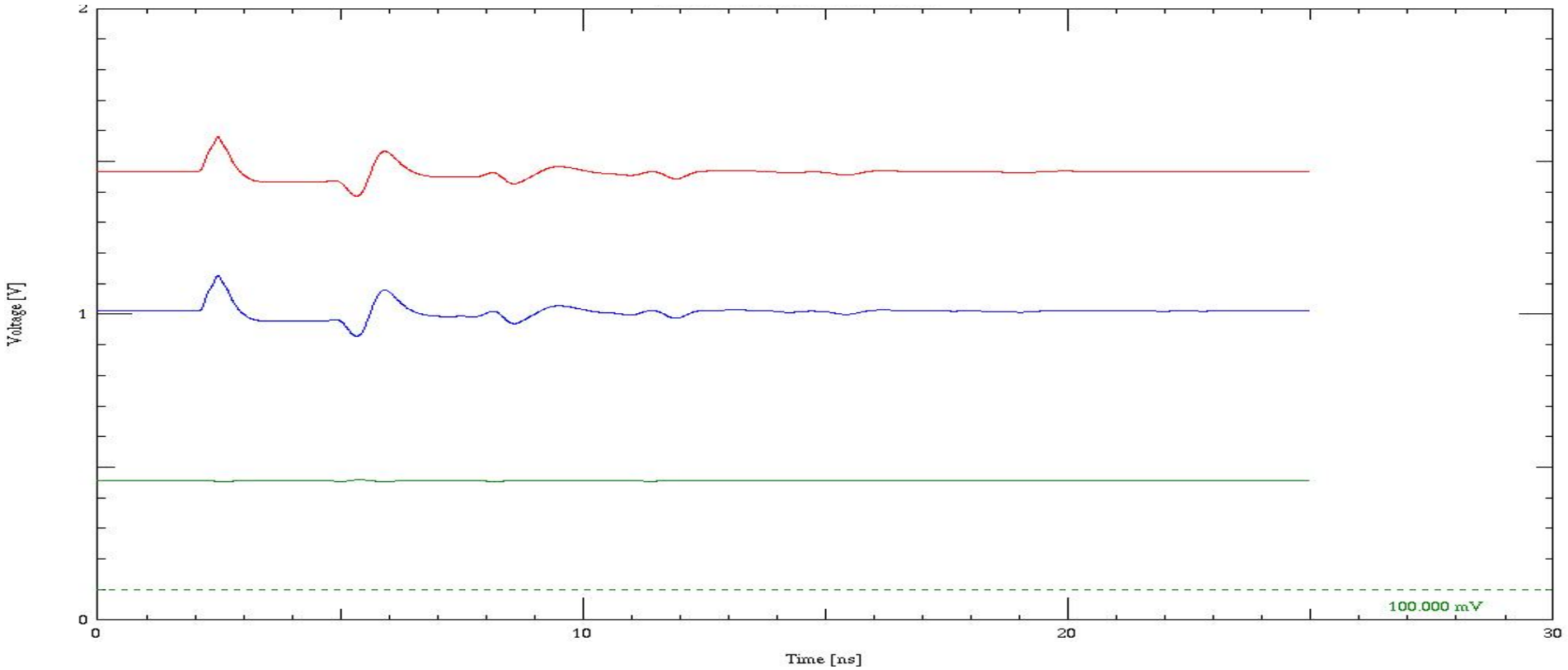
Two phases with 5ns bit time and the reconstructed difference signal, at the cable end after 0.3m.

Eye diagram @length 0.3m, rate 200Mb/s.



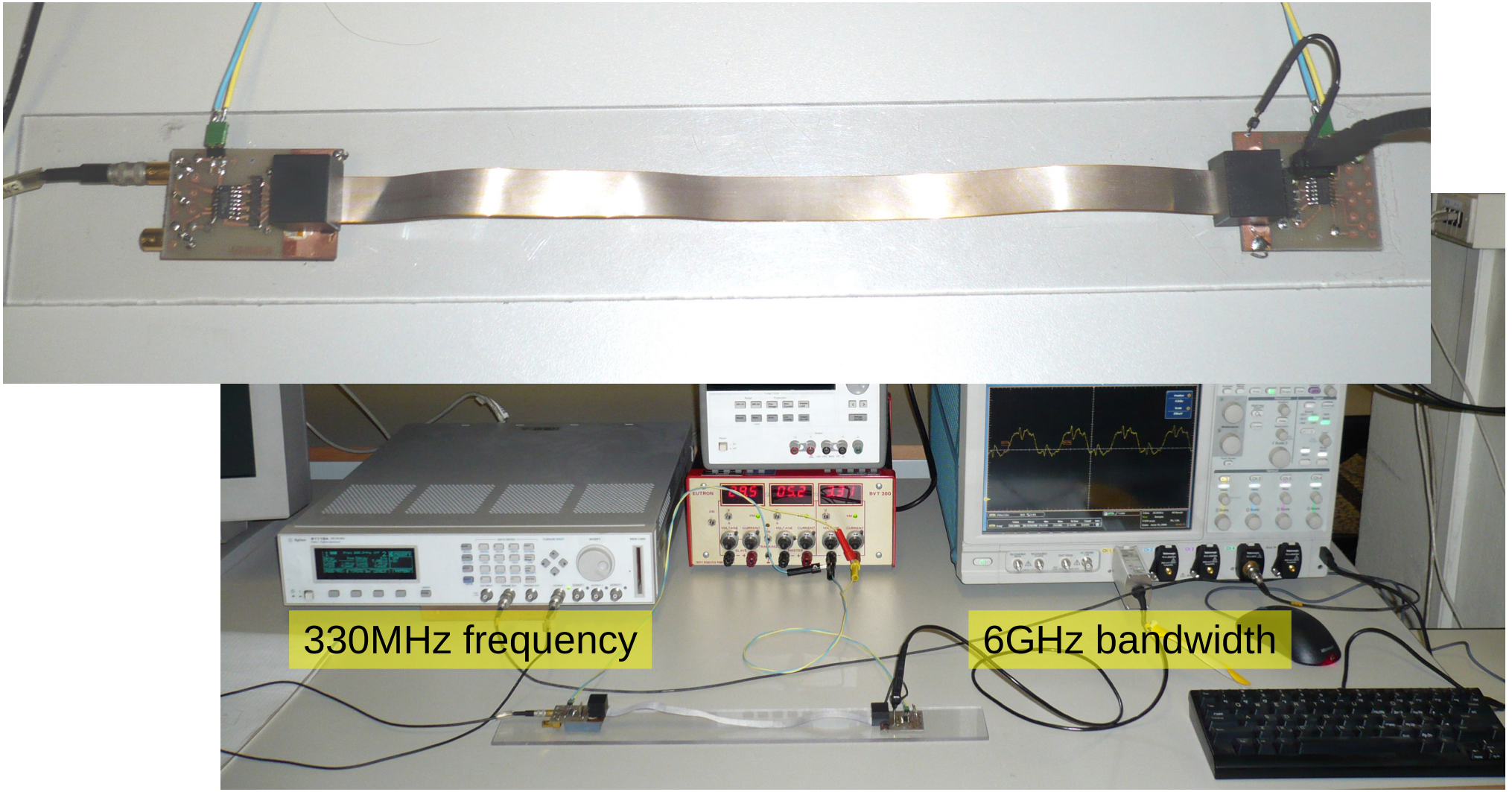
Eye diagram obtained by a random stream of data with 5ns bit time, at the cable end after 0.3m.

Cross talk of rise type @length 0.3m.



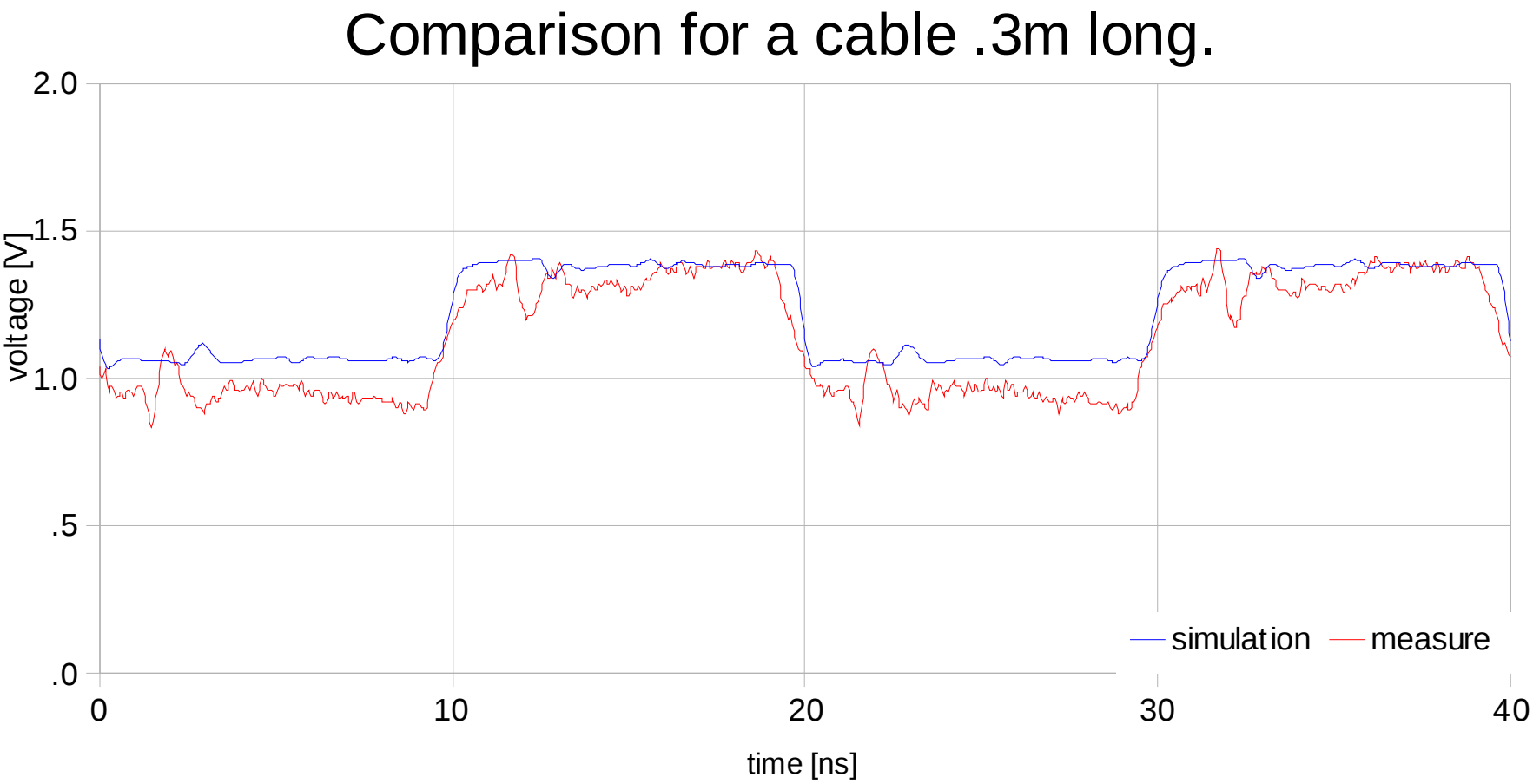
Two phases with the cross talk induced by a signal switching to high state and the difference, after 0.3m.

Cable and test setup.



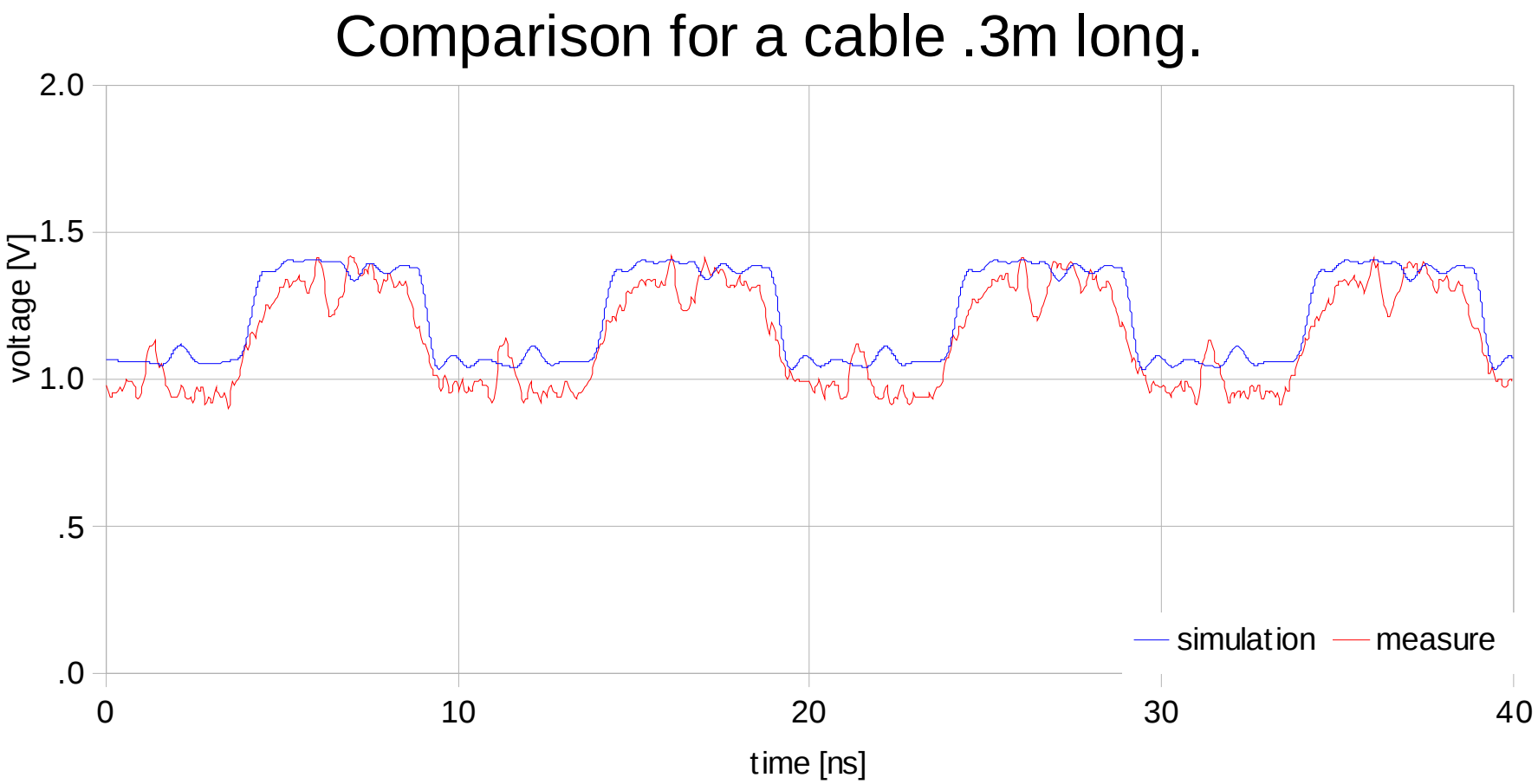
The cable contains about 20 differential pairs, and is wire bonded to the boards with driver and receiver.

Comparison @bit rate 100Mb/s.



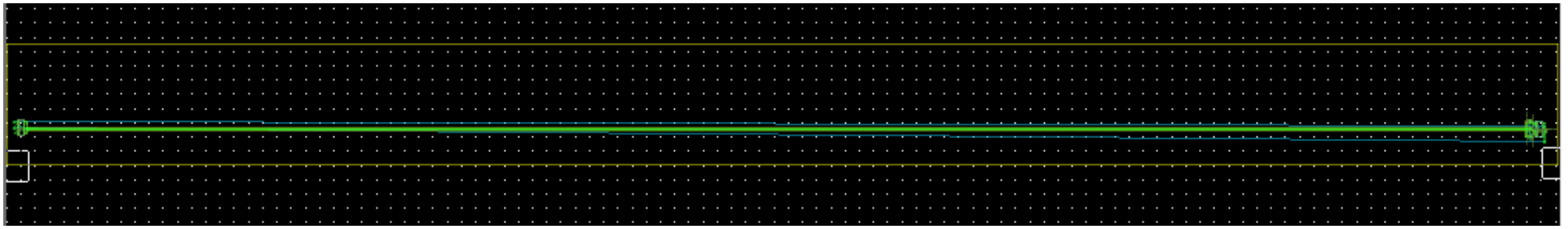
Comparison between simulation and measurement with 10ns bit time, at the receiver end after 0.3m.

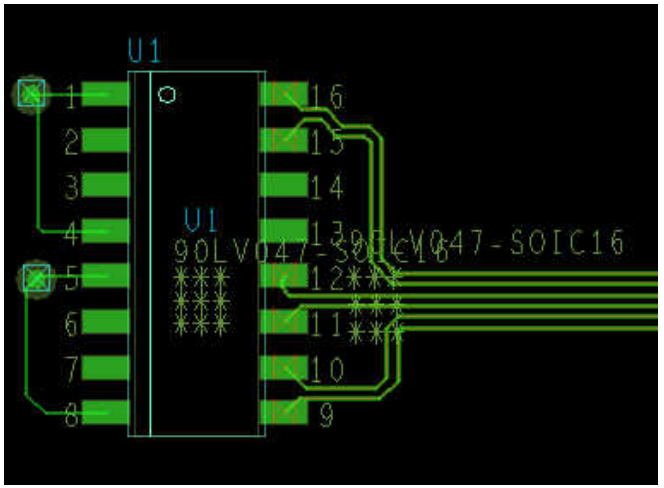
Comparison @bit rate 200Mb/s.

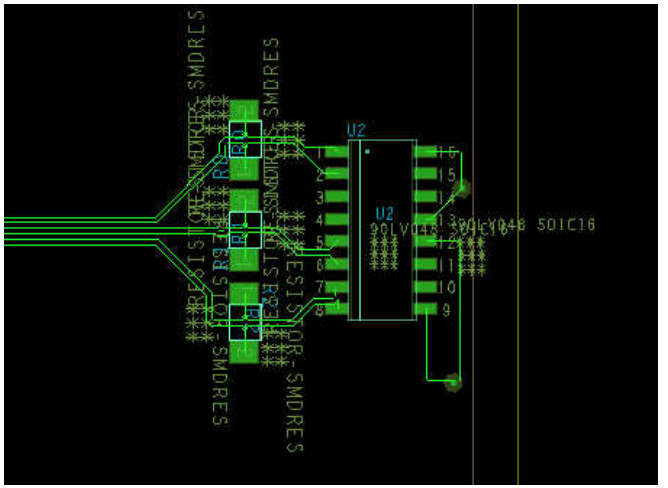


Comparison between simulation and measurement with 5ns bit time, at the receiver end after 0.3m.

PCB with a layout 1m long.

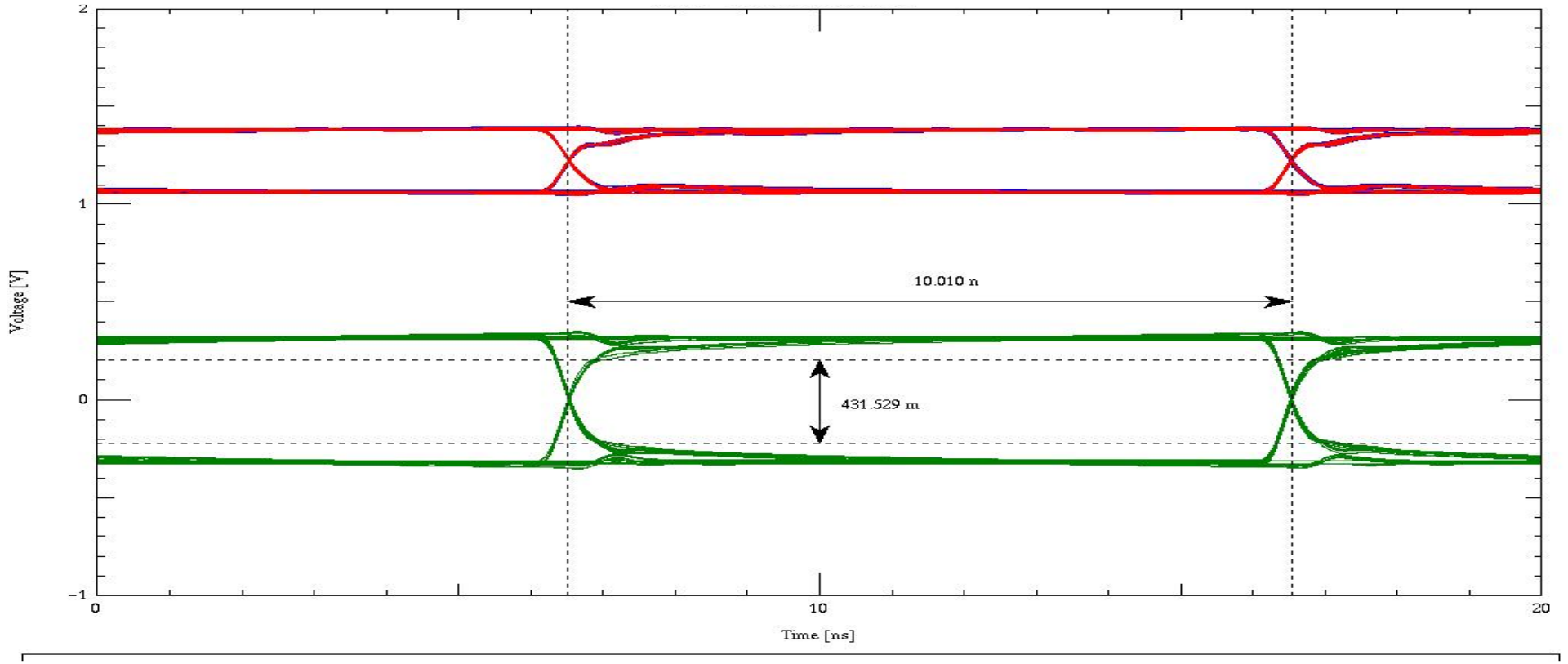






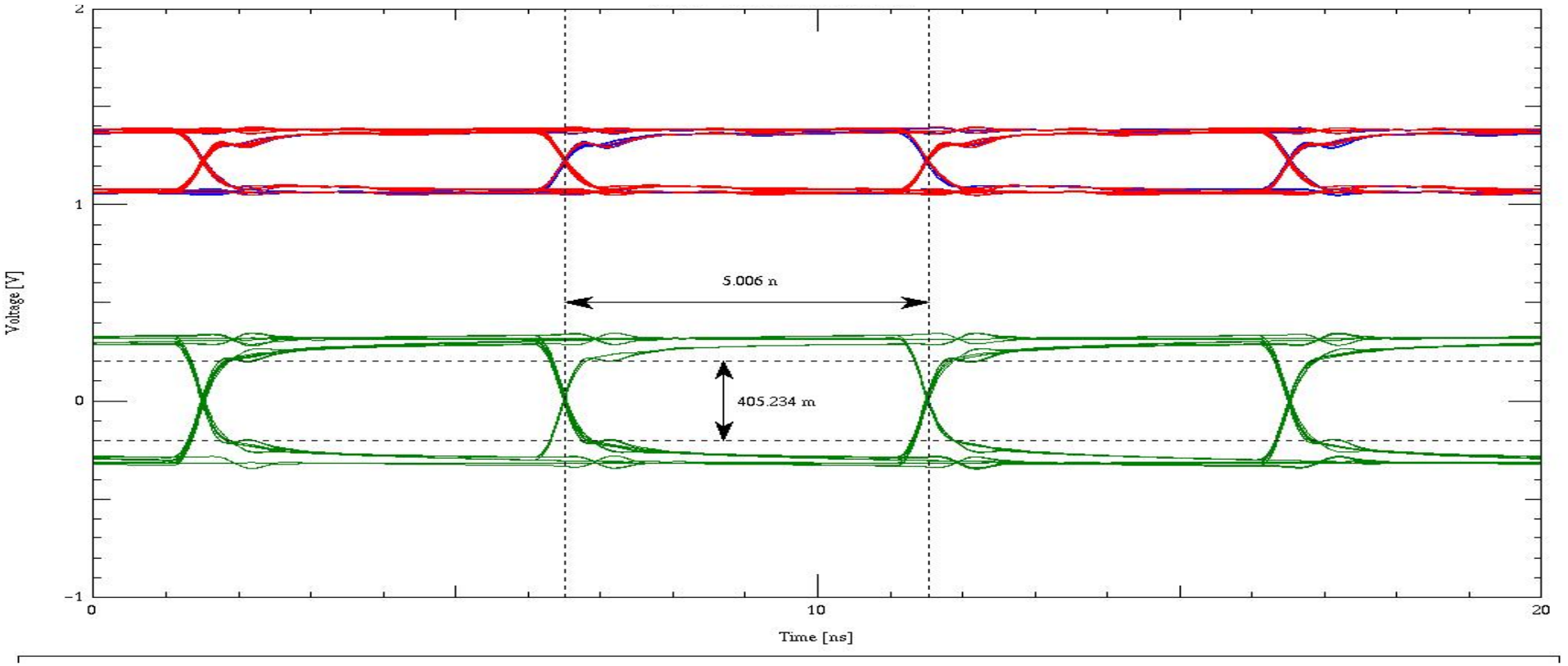
The structure is very similar to the previous one, but the total length has been increased to 1m.

Eye diagram @length 1m, rate 100Mb/s.



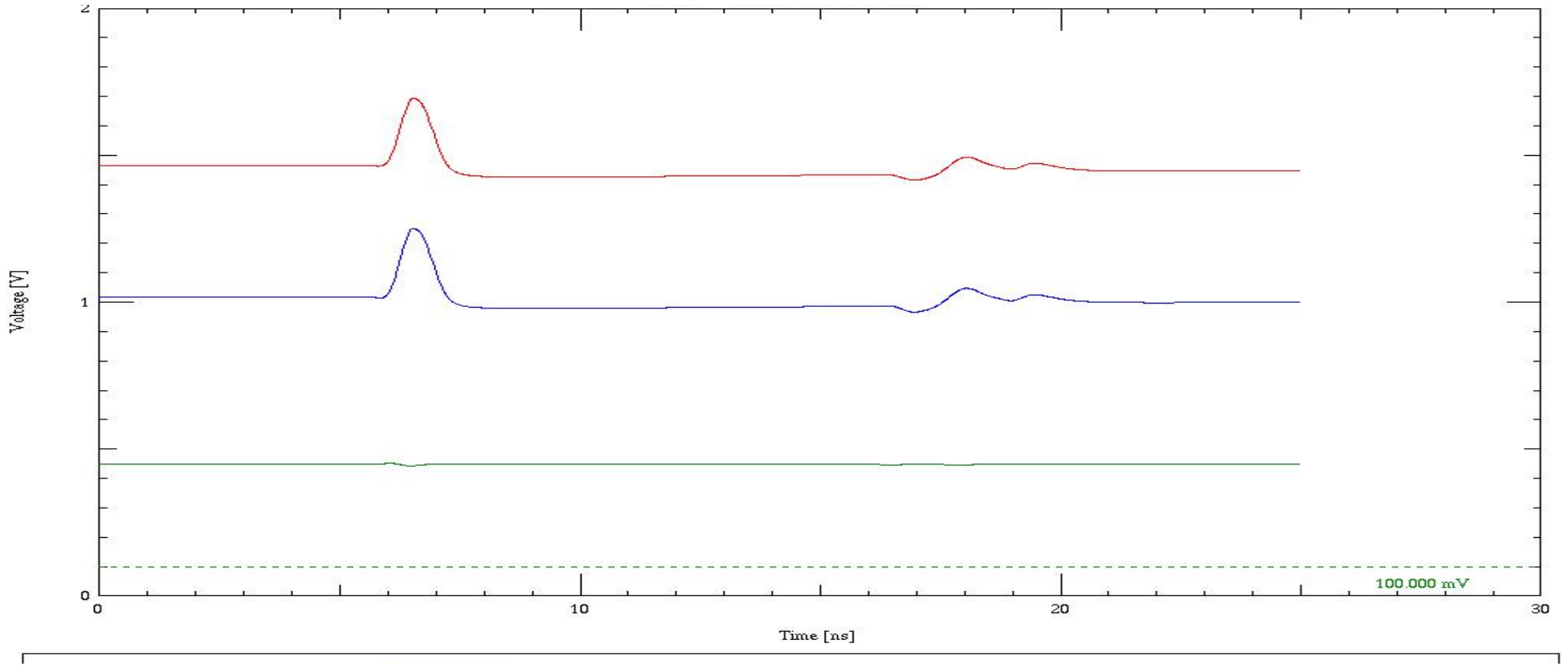
Eye diagram obtained by a random stream of data with 10ns bit time, at the cable end after 1m.

Eye diagram @length 1m, rate 200Mb/s.



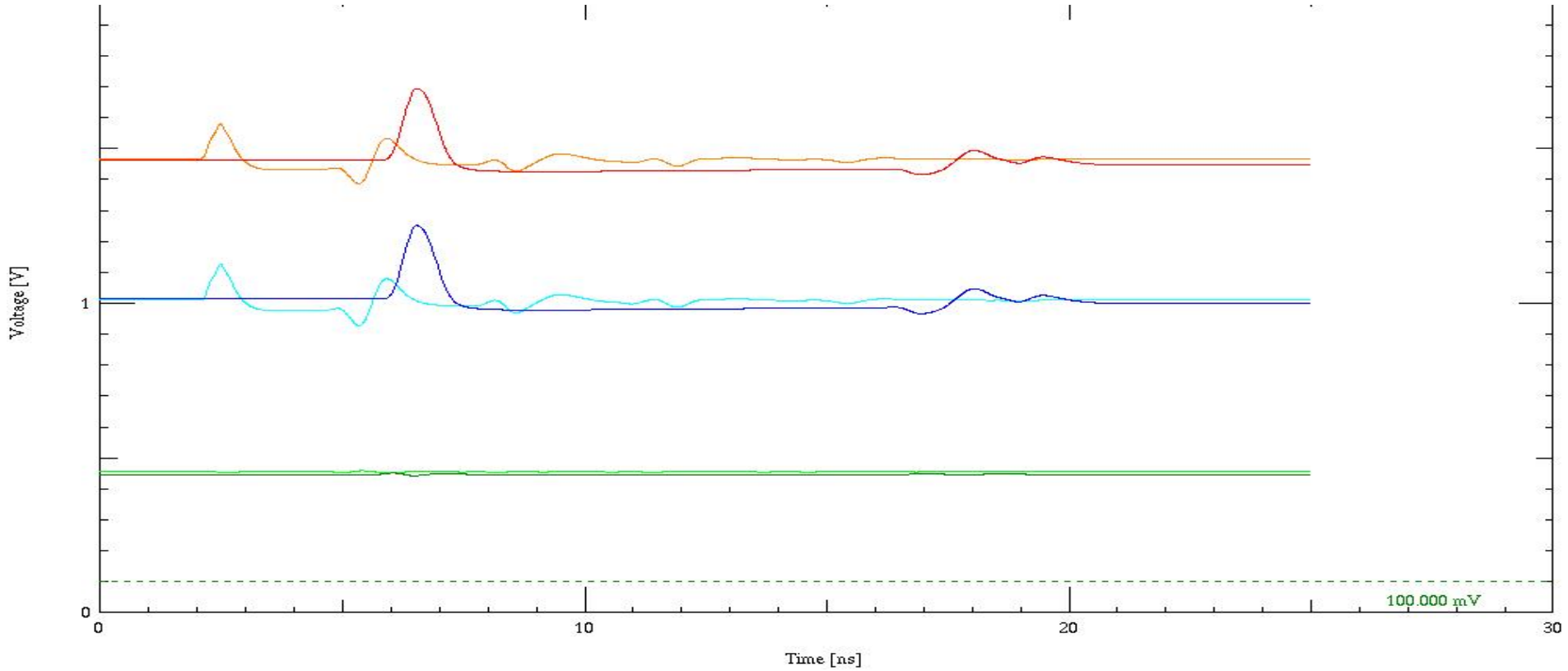
Eye diagram obtained by a random stream of data with 5ns bit time, at the cable end after 1m.

Cross talk of rise type @length 1m.



Two phases with the cross talk induced by a signal switching to high state and the difference, after 1m.

Cross talk comparison @length 0.3÷1m.



Cross talk induced by the same signal switching from low to high state, after 0.3m (small) and 1m (large).

Next steps.

Production of a new cable with a 1m length on a polymide (40µm) support and aluminum (10µm) deposited by a silicon-like technology, on a 6inch 'wafer'.

Other measurements to validate the simulations with the new structure, and at higher rate.