Two Single Wires and TWP

Nowadays all electronic/electrical system consists of big number of wiring components. Cables bundles can be reason of unwanted transmission of energy, which may adversely affect nearby equipment or other parts of the same piece of equipment.

One of the solutions for minimization of crosstalk between cables is using twisting pair geometry for cables, which reduces both noise emission and noise acceptance by the signal carried by differential pair.

Problem Definition

The aim of the application note is to show possibilities of XTalk Hybrid Analysis Type for calculation of noise produced by differential cable system.

For investigation two single wires and one TWP with differential feeding above the ground plane are considered. S-parameters are simulated and compared with measurements (see Fig.1-Fig.3).

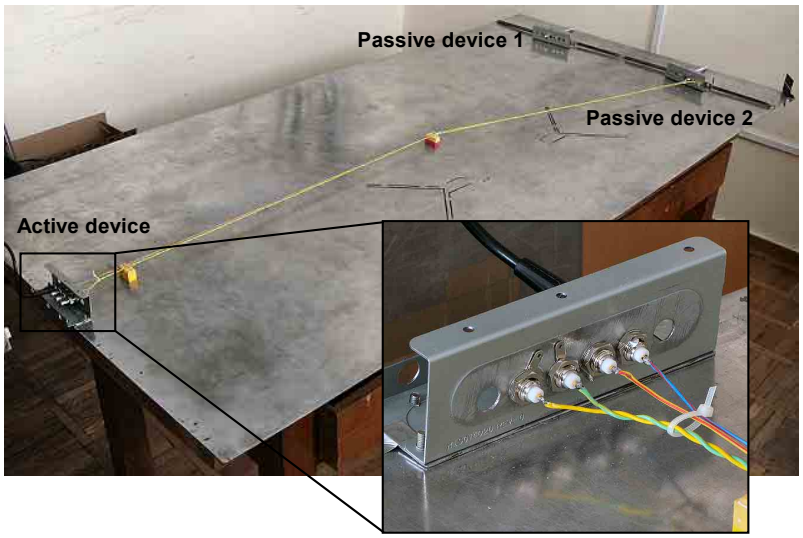

Fig. 1. Measurement setup

Fig. 2. Passive device 1

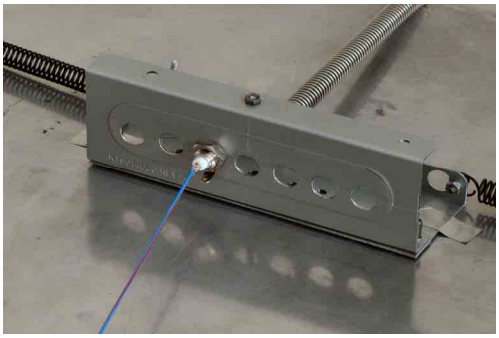

Fig. 3. Passive device 2

Crosstalk between wires is measured in EMCoS measurement laboratory.

Simulation model is shown in the figure below.

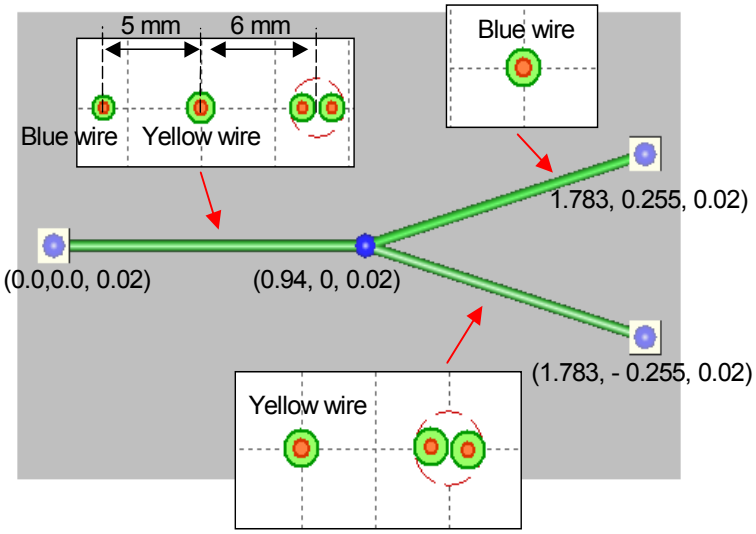

Fig. 4. Two single wires and TWP

Schematic representation of calculation model is represented in the figure below.

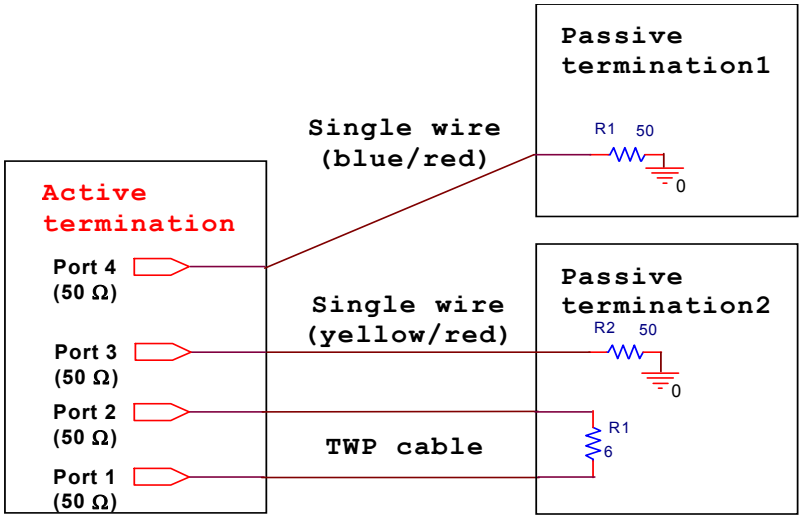

Fig. 5. Schematic representation

Numerical Results

For analysis reflection coefficient (S11) of TWP cable and transmission coefficient between TWP cable and single wires (S31 and S41) are measured and calculated.

The numerical results are shown below:

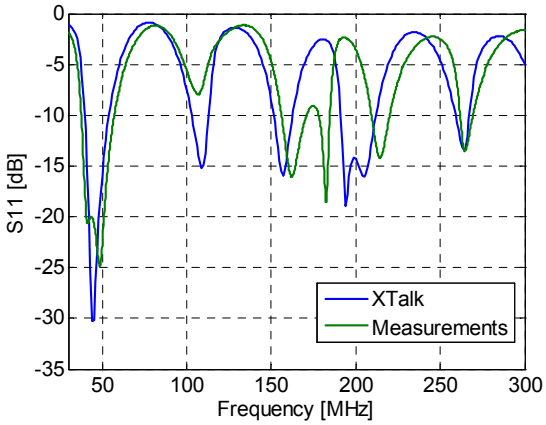

Fig. 6. Reflection coefficient (S11) vs. frequency

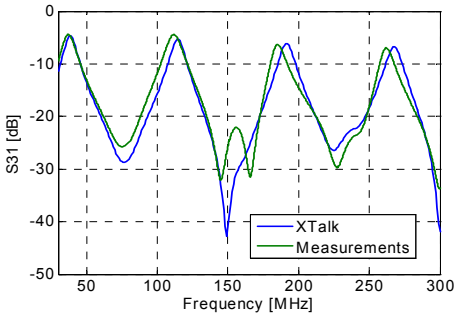

Fig. 7. Transmission coefficient (S31) vs. frequency

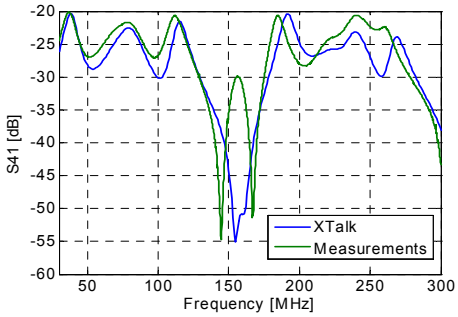

Fig. 8. Transmission coefficient (S41) vs. frequency

Conclusions

Results of application example show that XTalk Hybrid Analysis Type simulation results are in good agreement with measurements

The Xtalk simulation shows correct frequency behavior of both reflection and transmission coefficients