

Circuit & Application

The circuit was an equalizer for wire-bound transmission to be used as signal shaper in the final stage of a repeater. Process technology used was 180nm.

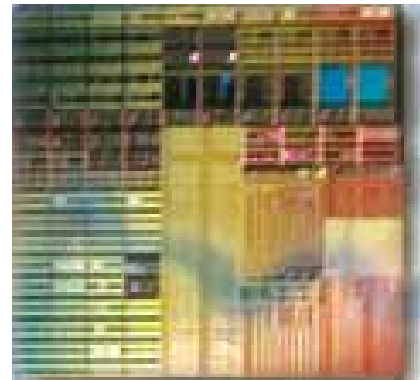
Problem-Formulation and Goals

The main performance value is the maximum distance where the signal can be estimated as still stable.

- ◆ Specified minimum transmission range: 1200m
- ◆ Transmission range designed and sized by hand: 1000m

Design Problems without WiCkeD:

- Performances not meeting all specifications.
- The transmission range was too low.
- Net result yield = 0%.



Solution using WiCkeD

It was necessary to use a new wire-line transmission model and to size the circuit for this model. The new model was set up based on the existing specifications with knowledge from the prototype measurements. To reach the specifications the new transmission model was too complex to be sized by hand.

Step 1 – Sensitivity Analysis

WiCkeD's methods for performance and noise improvement were used to analyze and optimize the transmitter for the new complex transmission model. WiCkeD's sensitivity analysis quickly isolated the critical devices that were responsible for the low performance values.

Step 2 – Nominal Diagnoses

WiCkeD's DFM Diagnosis & Optimization (Performance Optimization) enabled the designer to easily modify the design parameters interactively and/or automatically for the critical devices and quickly assess how to improve the performance.

Step 3 – Worst-Case Diagnosis

The performances were analyzed at their respective worst-case process variations of the critical devices. This method provides ideal optimization directions for sizing. The circuit was semi-automatically sized to optimize the performance.

Step 4 – Monte Carlo Analysis

The parametric yield was increased to 99.99% (4 sigma) as validated with Monte Carlo. The transmission range was optimized to a value of 1500m, which surpassed the specification. This was verified in second silicon.

WiCkeD Results

