Data Sheet

SnpExpert:
S-Parameter Exploration

S-parameters, traditionally used in RF/Microwave design, are widely adopted by high speed digital designs as the multi-gigabit interface continues to advance to higher data rate. Xpeedic SnpExpert provides a quick way to understand the electrical characteristics of the passive interconnectors in a system by not only viewing the S-parameter in frequency domain but also examining the time domain reflectometry (TDR). One-click definition of differential pairs and victim/aggressor setup, together with the built-in NEXT, FEXT, PSXT, ILD, ICR, and ICN, allows user to quickly evaluate the crosstalk. The built-in delay and skew calculator requires no cumbersome circuit schematic setup. The built-in compliance metrics with IEEE 802.3ap, 802.3ba, 802.3bj, SAS, PCIe, SATA and OIF CEI 25G/28G standards quickly reveal the S-parameter compliance. The built-in passivity, causality, reciprocity, and stability metrics tell the quality of the S-parameter, and built-in enforcement algorithm fix S-parameter quality issues. The built-in template automates the process from S-parameter plotting to report in Word or PPT. The through-only de-embedding method helps SI engineers to quickly obtain the DUT characteristics by removing the fixture effect. Accurate NRZ and PAM-4 eye diagram calculation with equalization and pre-emphasis technology help user get an intuition feeling about high speed channel performance.

Key Points

- Implementation of Ribbon UI offered by Microsoft in their office solutions, and makes Xpeedic application keeping up with the time, and has a modern look and feel.
- Fast multiple S-parameter touchstone files import with multi-threading technology enabled to accelerate reading speed.
- Support plotting frequency domain S-parameter, time domain reflectometry (TDR), Smith Chart and Polar Plot.
- Grid plot (PLTS) for S-parameter and TDR.
- One-click to define differential pairs and victim/aggressor pairs
- Built-in crosstalk analysis for both single-ended and differential pairs, and plot FEXT, NEXT, PSXT, ILD, ICN, ICR, IL_fitted, ILD_rms and ICR_fit based on compliance metrics.
- Built-in compliance metrics such as IEEE 802.3ba, IEEE 802.3bz, IEEE 802.3bj, OIF CEI-25G/28G, SAS 3.0, PCIe 3.0, SATA 3.2,MIPI, SATA3.0 and so on.
- Built-in passivity, causality, reciprocity, stability metrics calculation and enforcement algorithm to reveal and correct S-parameter quality.
- Built-in delay and skew calculator for both single-ended and differential pairs.
- Built-in several S-parameter utilities, such as reorder, gating, split, combining, multiple S-parameter cascading, averaging and export.

- Built-in template to automate the process from S-parameter plotting to report in Word and PPT
- Built-in template for RF/Microwave components such as inductor, capacitor, filter, balun, diplexer and coupler
- Three de-embedding methods to obtain the DUT characteristics, including Open-Short De-embedding, Open-Thru De-embedding, Thru-Only De-embedding and Halve S-parameter Matrix.
- Support several Dk/Df extraction methods, including S3 based method, Delta-L based method and optimization based method.
- Support NRZ and PAM-4 eye diagram, also add CTLE, FFE and FIR for Tx or Rx during eye diagram calculation, CTLE compensation can be previewed.
- Support double and complex reference impedance conversion.
- Support variable definition with built-in math functions, including unwrap, moving_average and so on.
- Add S-parameter and TDR quick plot panel in SnpExpert main window.

- Support Python Scripts
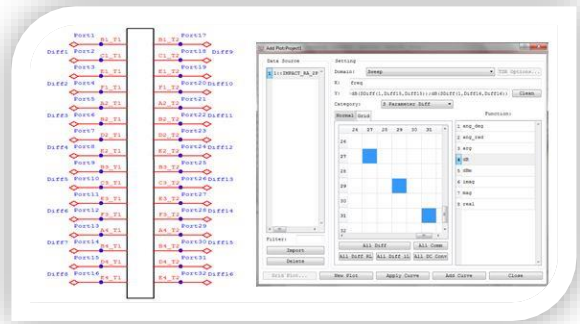
FEATURES

Modern Look and Feel

Implement the concept of Microsoft Ribbon, and makes SnpExpert keeping up with the times.
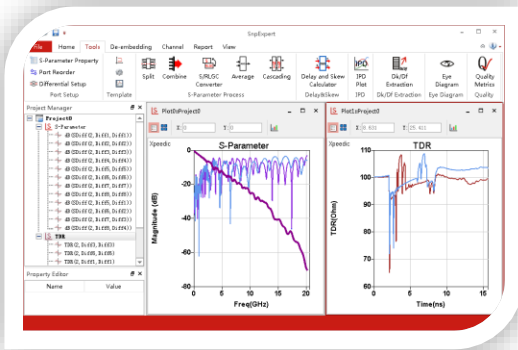

SnpExpert

Easy S-parameter and TDR Plot

Provides several ways to easy plot frequency domain S-parameter and TDR.
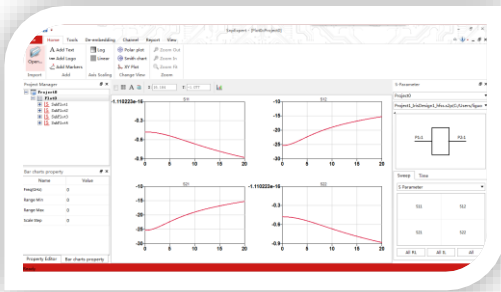
S-parameter and TDR

Easy Diff-Pair Setup and Processing

SnpExpert provides easy ways to setup the differential pairs and rich functions for post-processing.
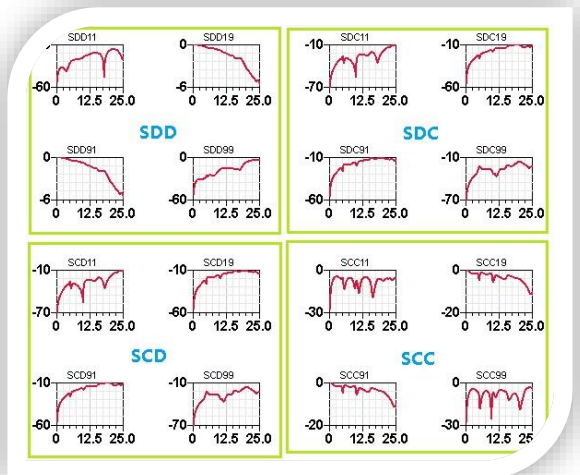

Diff-Pair Setup

Grid Plot

SnpExpert allows users to grid plot diff-pair S-parameter and TDR in both single-ended and differential modes similar to PLTS.
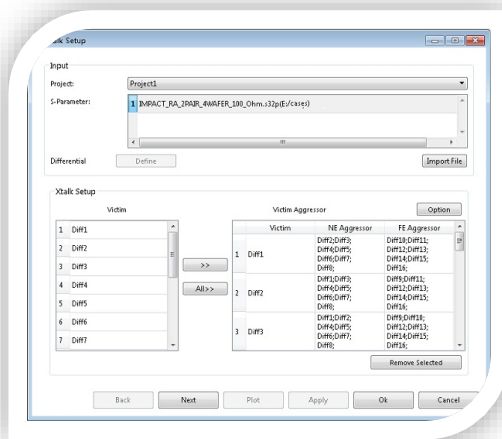

Grid Plot

Powerful Crosstalk Analysis

Crosstalk analysis flow is quite helpful for user to evaluate the crosstalk effect after setup victim and aggressor:

- Crosstalk between single-ended port
- Crosstalk between differential pairs
- Crosstalk between single-ended port and differential pair
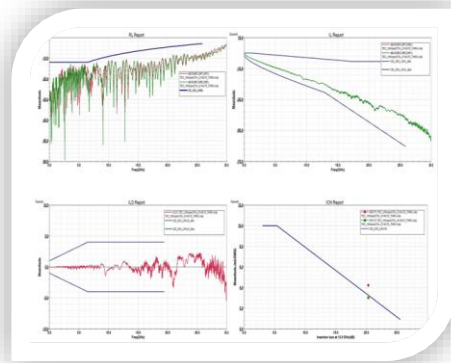

Victim/Aggressor Setup

SnpExpert has built-in crosstalk plots including FEXT, NEXT, PSXT, ILD, ICN, ICR, IL_fitted, ILD_rms and ICR_fit.
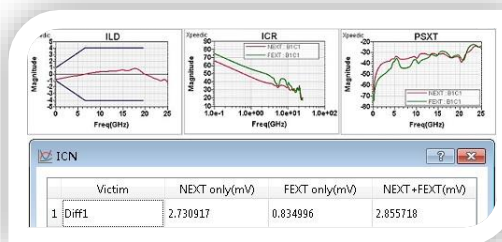
Crosstalk Plot

Compliance Metrics

Built-in Compliance metrics: IEEE 802.3ap, IEEE 802.3ba and, IEEE 802.3bj, OIF CEI-25G/28G, SAS 3.0, PCIe 3.0, SATA 3.2 and so on.


Built-in Compliance Metrics

Quality Metrics

SnpExpert has built-in algorithm to evaluate S-parameter quality metrics and fix quality issues based on enforcement algorithm, including passivity, causality, reciprocity and stability.
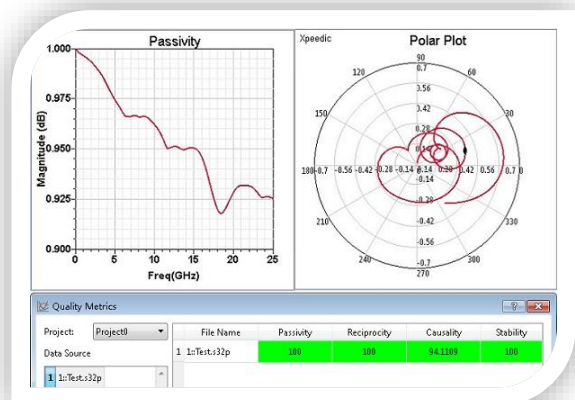

Quality Metrics

Delay and Skew Calculator

SnpExpert has built-in delay and skew calculator for both single-ended trace and differential pairs.
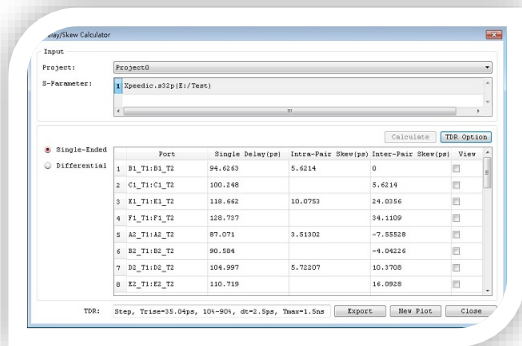
Delay and Skew Calculator

Built-in template for RFIC

SnpExpert has built-in template to show S-parameter, L, Q, M, K and other parameters for various RF components, such as inductor, transformer, filters, balun, diplexer, and coupler.
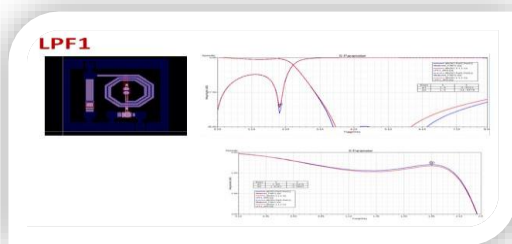

RFIC Template

Powerful De-embedding Method

Support multiple de-embedding methods to meet different application scenario:

- Open-Short De-embedding to remove the pad parasitic for on-chip applications.
- Through-Only De -embedding to remove the fixture effect for SI applications, support both symmetric and asymmetric TOD w/ and w/o fixture A or fixture B.
- Halve S-parameter Matrix to get the s parameter of the 2x through-only fixture.
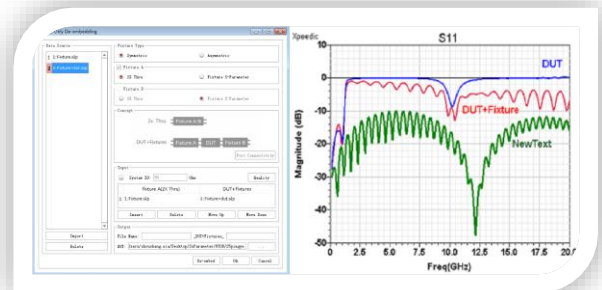
De-embedding Method

Accurate Dk/Df Extraction

After using Thru-Only De-embedding or Delta-L De-embedding method to remove fixture effect from DUT, Dk/Df extraction method is applicable to extract Dk, Df and even surface roughness. SnpExpert supports several Dk/Df extraction methods, including S3 based method, Delta-L based method and optimization based method. Extracted Dk/Df is quite easy to export for specified frequency points in excel format.
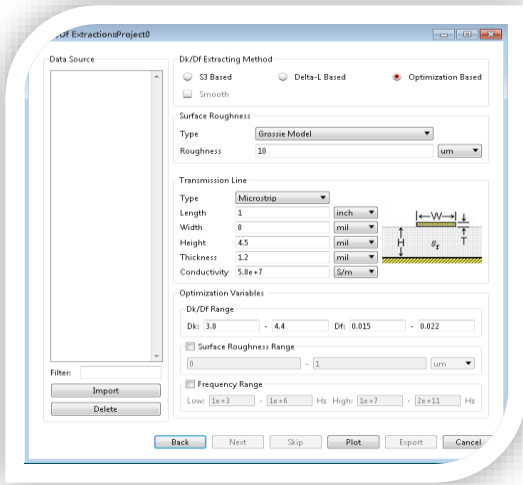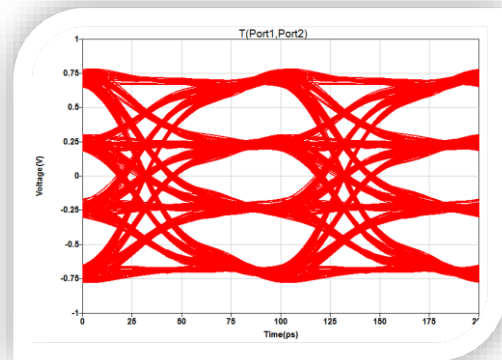
Dk/Df extraction
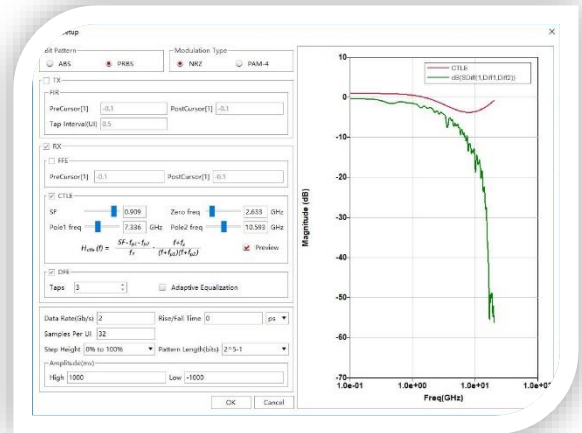
CTLE, FFE, DFE settings

Eye Diagram

Plot NRZ and PAM-4 modulation eye diagram based on bit pattern, data rate and rise/fall time setting, also support CTLE, FIR, FFE and DFE for both Tx and Rx.

Eye Diagram

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