

Huwin Solutions

| ACVS

- Next-Generation Signal Integrity Solutions for High-Speed Interfaces : (LP)DDR, GDDR, HBM, PCIe, UCIe, etc
- Basic-SI Analysis : IL/RL/Xtalk, TDR, TDT, VTF, and more.
- Parallel Bus Analysis: Supporting transient and single-ended AMI simulations.
- SerDes Analysis : Fully automated AMI simulations including full-channel crosstalk.
- C-PHY Analysis: Channel simulation with built-in EQ.
- S-Tools: Line-FEM Pro, S-Designer, S-Correction, PerfectCal Pro.

| SnpView.Com

- A Professional, High-Value Signal Integrity Simulator : Free Online Access
- TDR, TDT, Eye-diagram, BER
- PerfectCal®
(2xThru de-embedding with impedance correction)
- ChannelView : High-speed channel simulator with EQ/Jitter

Designing the future

We continue to pioneer new technology, to reduce the gaps between boundaries.

Our Mission

To lead the high-performance segment of the EDA market by leveraging engineering automation across simulation, report, and design optimization.

Huwin is based on more than 20 years of experience in EM simulation, high-speed digital signal/power/ground design, RF and EMC, and more than 10 years of R&D. We continue to develop and supply engineering solutions and collaborate with enterprises through consulting.

Huwin is ANSYS Channel Partner specialized for technical support for the ANSYS solutions.

Huwin Solutions

ACVS Next-Generation Signal Integrity Solutions for High-Speed Interfaces

Supporting 1,000+ ports and 100GB+ ultra-broadband S-parameters.

Basic SI

Quick and easy verification of all essential SI analysis items.
→ IL/RL/X-talk, RLC, Z0, TDR, TDT, Skew, VTF, and more.

Parallel bus analysis

Supports conventional transient, single-ended AMI
→ (LP/G)DDR, HBM, UCIe, etc.

SerDes analysis

Supports fully automated AMI simulation including all crosstalk effects.
→ PCIe, UFS, etc

C-PHY analysis

Channel simulation with built-in EQ.

PDN analysis

S-Tools

Line-FEM Pro : High-precision transmission line design tool utilizing FEM.
S-Designer : Rapid S-parameters generation for the given IL/RL/X-talk conditions.
S-Correction : Resolves causality and passivity issues in S-parameters.
PerfectCal[®] Pro : Professional-grade 2xThru fixture de-embedding solution.

SnpView.com

A high-value, professional signal integrity simulator (free to use online)

Frequency/Time domain analysis

IL/RL/X-talk, TDR, TDT, Eye-diagram, etc.

PerfectCal[®]

Essential version of 2xThru fixture de-embedding tool

ChannelView

High-speed channel simulator with EQ/Jitter
→ Supports cascading of channel S-parameters

ACVS Advanced Channel Verification System



Parallel bus and SerDes channel verification traditionally demands significant time and effort. Engineers must configure complex channel systems, including driver/receiver models and S-parameters, perform extensive simulations for various analysis scenarios, and meticulously analyze and report results. Huwin ACVS revolutionizes this process through full automation of configuration, simulation, and reporting, significantly improving the efficiency of channel analysis. Powered by the newly developed **SimNX engine**, the solution ensures both accuracy and high performance. Additionally, fully customizable reporting enables engineers to quickly and easily evaluate multiple channels and use cases with confidence.

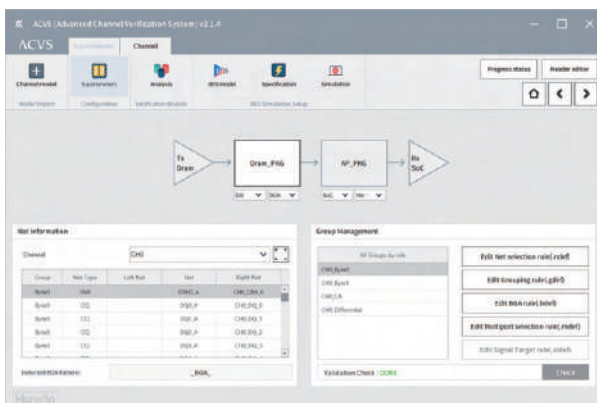
Powered by the advanced SimNX engine, Huwin ACVS delivers precise and efficient analysis for next-generation high-speed interconnects across Interposer, Package, and PCB, including HBM, UCIe, and PCIe. The solution seamlessly processes large-scale S-parameters with 1,000+ ports and 100GB+ file sizes, while automating complex analysis and reporting workflows. Comprehensive results are provided for key parameters such as losses, reflections, crosstalk, TDR/TDT, eye-diagrams, and BER, ensuring unparalleled accuracy and efficiency for high-speed system designs.

Key Benefits

- Automatic System Configuration and Simulation for effortless setup.
- SimX engine: processes **large-scale S-parameters with 1,000+ ports and 100GB+ file sizes**.
- Supports precise and efficient analysis of **(LP)DDR, HBM, UCIe, PCIe**.
- Provides fully customizable reports to meet your specific needs.

Step 1.

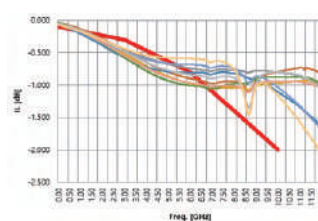
Auto configuration and simulation



Step 2.

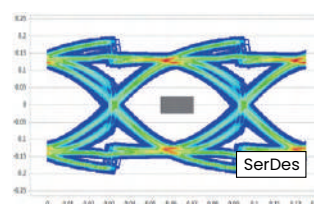
Auto reporting

Freq. domain



- Insertion/return loss
- NEXT, FEXT
- PDN analysis
- Z0 estimation

Time domain



- TDR, TDT
- Eye-diagram
- BER, Bathtub
- Delay, skew, slew rate, etc.

ACVS Advanced Channel Verification System

| High-precision, high-speed, and reliable SI/PI analysis

EM simulation

ACVS : Channel simulation/reporting

Report

Automation

S-parameters

• ANSYS SIwave, HFSS, etc.

Reporting

- Automation of system simulation with **SimNX**® engine.
- Reporting : charts and measurement.
- Applications : DDR4/5~, **HBM3+**, **PCIe**, **UCle**, C-PHY, etc.

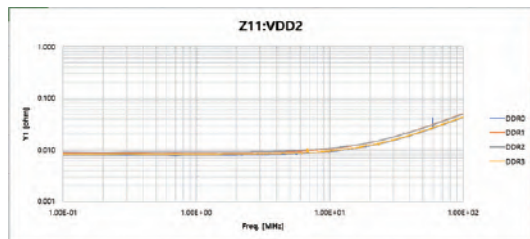
S-parameters with 1000+ ports, 100GB+ file size

• Customized report

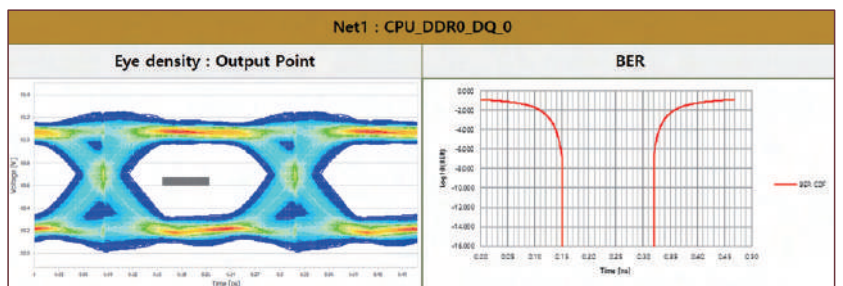
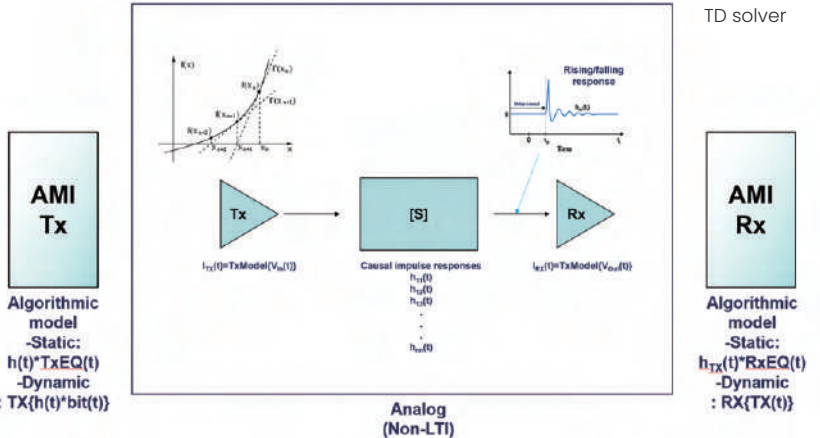
| SimNX engine

Large-scale S-parameter files

Efficient processing for higher density channels (1000+ ports, 100GB+ file size)



Channel	Q1/MHz	Spec	Results	100MHz	Spec	Results
DDR0	Q08	D010	PASS	D043	0-100	PASS
DDR1	Q009	D010	PASS	D050	0-100	PASS
DDR2	Q009	D010	PASS	D050	0-100	PASS
DDR3	Q008	D010	PASS	D043	0-100	PASS

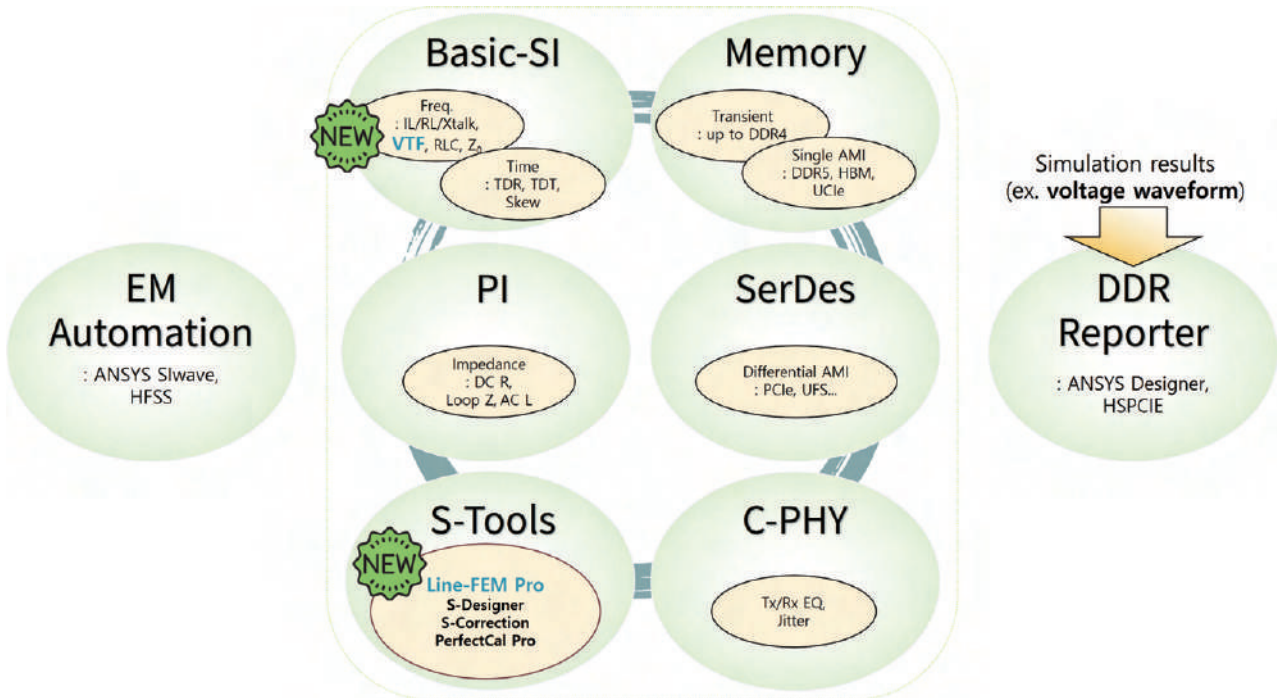


Eye-diagram, BER analysis

A High-efficiency and Precision Simulation Engine for Signal and Power Integrity Analysis

ACVS Advanced Channel Verification System

Analysis modules



Comprehensive Support for Advanced High-speed Channel System Analysis Modules

Basic-SI analysis

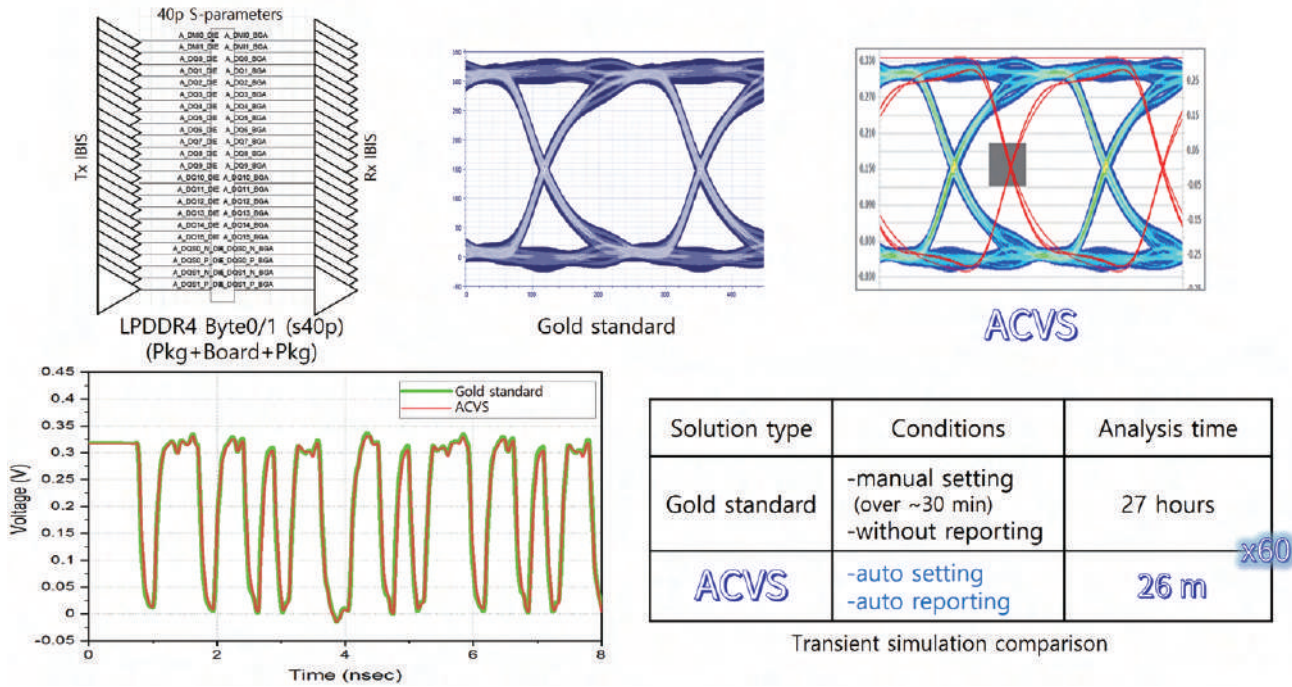
The screenshot shows the ACVS software interface with a 'One click!' button. An arrow points to a collection of SI analysis charts including RL, NEXT, FEET, TDT Delay (ps), TDT Skew Rate (V/ns), TDT MidV Time (ps), TDT Skew (ps), Resistance (ohm) @1GHz, Inductance (nH) @1GHz, Capacitance (pF) @1GHz, Z₀ by LC (ohm) @1GHz, Z₀ by sweep (ohm) @1GHz, TDR, and TDT. A magnifying glass highlights the FEET chart. A 'Total Check-up' label is at the bottom right.

Channel.s#p
 'Advanced channel connection method'
 for preserving all frequency points
 of each .s#p files

Fast and Comprehensive Verification of Key SI Analysis Metrics
 Includes: IL, RL, Crosstalk, RLC, Z₀, TDR, TDT, Skew, VTF, and more

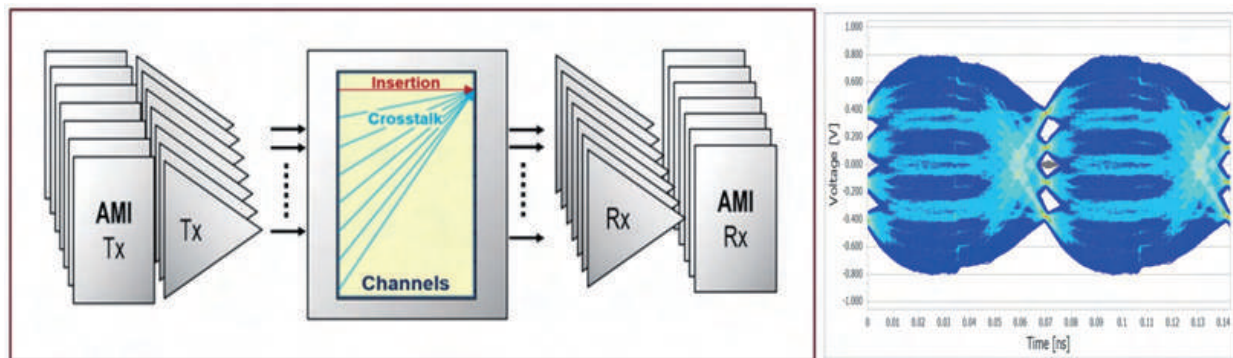
ACVS Advanced Channel Verification System

Case study : LPDDR4 – Transient simulation



ACVS Sets a New Benchmark for Efficiency in Time-Domain Circuit Simulations.
(4.266Gbps, PRBS15, Tx/Rx IBIS Models)

SerDes AMI simulation with all crosstalk effects

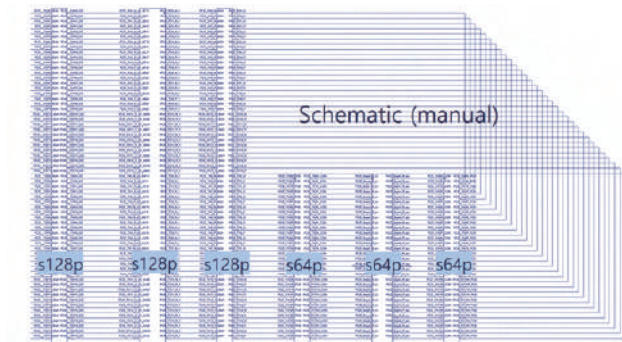


SerDes AMI Analysis	Golden Standard-1 (circuit simulator)	Golden Standard-2 (circuit simulator)	Huwin ACVS (SI solution)
Single Pair with Cross-talk	Not Supported	Support	Support
Full Channel Pairs with Cross-talk	Not Supported	Not Supported	Support
Report Automation	Not Supported	Not Supported	Support

Supports Fully Automated AMI Simulation Including All Crosstalk Effects

ACVS Advanced Channel Verification System

| Case study : PCIe Gen5 - SerDes AMI simulation



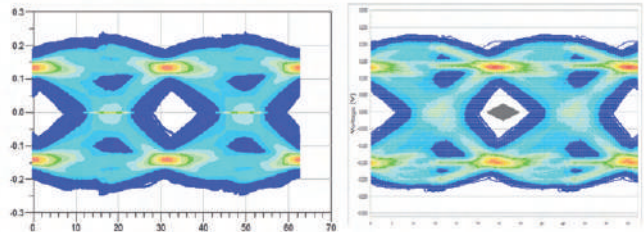
Tx/Rx AMI models + Channel S-parameters
 PRBS: total 2,270,000 bits
 (=ignore bits: 2,240,000+ input bits: 30000, PRBS15)

(Ignore_Bits (Usage Info) (Type Integer) (Default) **2240000**)

Solution type	Conditions	Analysis time
Competitor-2	-manual setting (over ~1h) -without reporting	9h 30m
ACVS	-auto setting -auto reporting	3 h 40 m

Analysis results

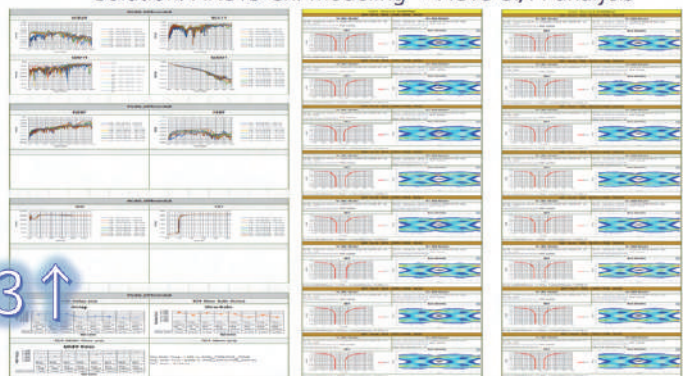
x3 ↑



Competitor-2

ACVS

Solution: ANSYS Ch. modeling + ACVS SI/PI analysis

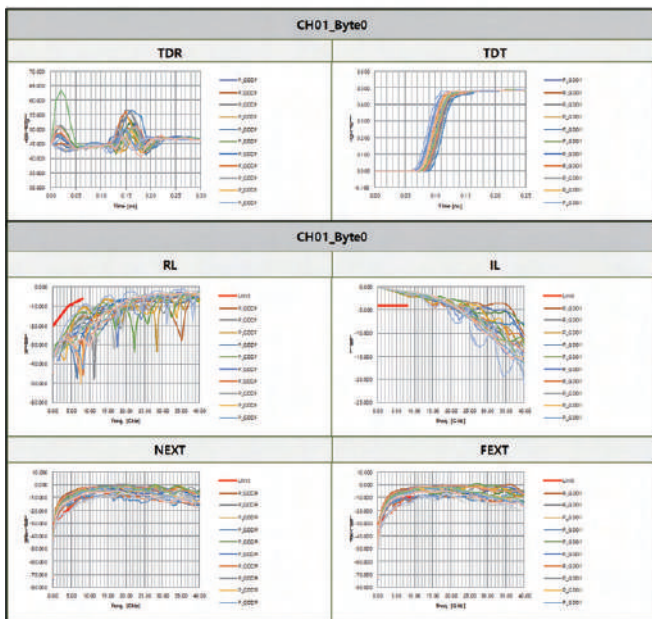


Basic-SI: 38m

AMI: 3h 40m

ACVS Sets a New Standard for Efficiency in SerDes AMI Simulation.

| Case study : Chiplet interfaces for AI accelerator chips



Basic-SI: 2h. 40m (GDDR6 8 Bytes)

Total analysis time < 10 hour



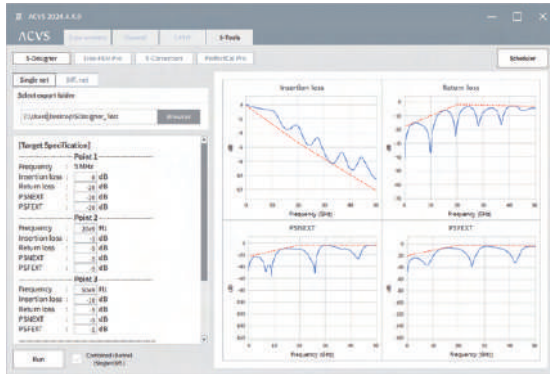
Enabling all Check-up

AMI analysis: 6h.30m (GDDR6 8 Bytes)

Comprehensive Channel Verification for High-speed Interfaces in AI Chip
 PCIe Gen5(32Gbps x 32ch.), GDDR6(16Gbps, > 300 I/O nets), HBM3(6.4Gbps, 1024 I/O nets)

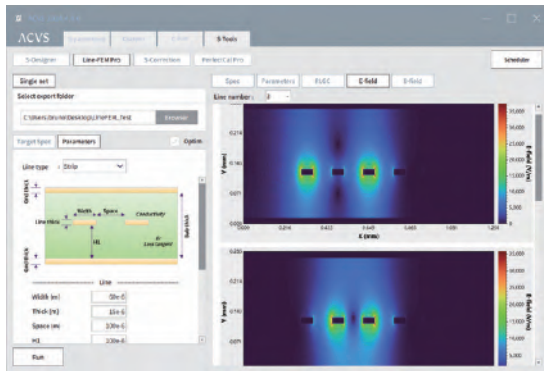
ACVS Advanced Channel Verification System

| S-Tools



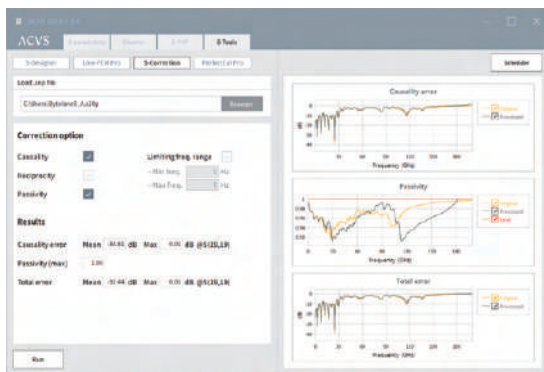
1) S-Designer

- Rapid S-parameters generation for the given IL/RL/X-talk conditions.
- Supports single-ended lines, differential pairs, and 'Byte mode' (single + diff.)



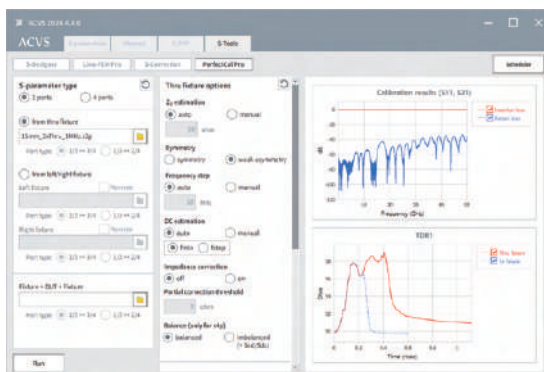
2) Line-FEM Pro

- High-precision transmission line design tool utilizing FEM.
- Supports single-ended lines
- Exports S-parameters and W-elements



3) S-Correction

- Resolves causality and passivity issues in S-parameters.
- Enforcement of causality, reciprocity, and passivity of given S-parameters

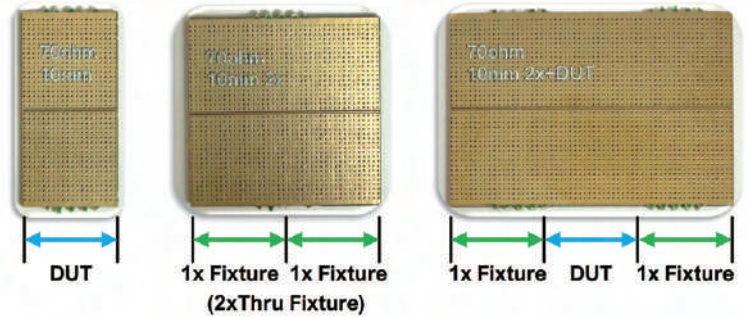
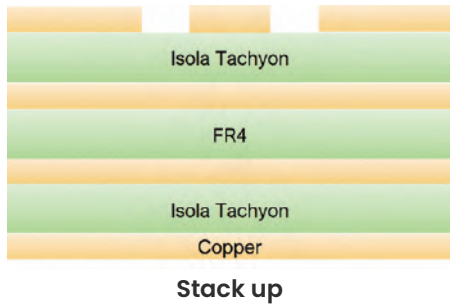


4) PerfectCal® Pro

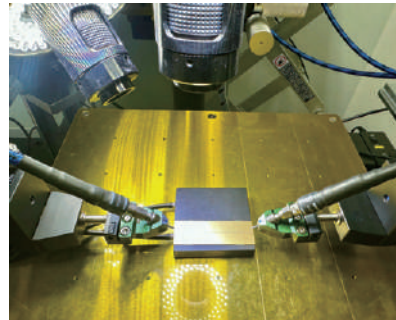
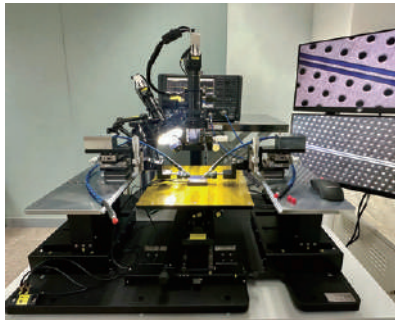
- Professional-grade 2xThru fixture de-embedding solution.
- Supports asymmetry and impedance correction (IEEE P370).

ACVS Advanced Channel Verification System

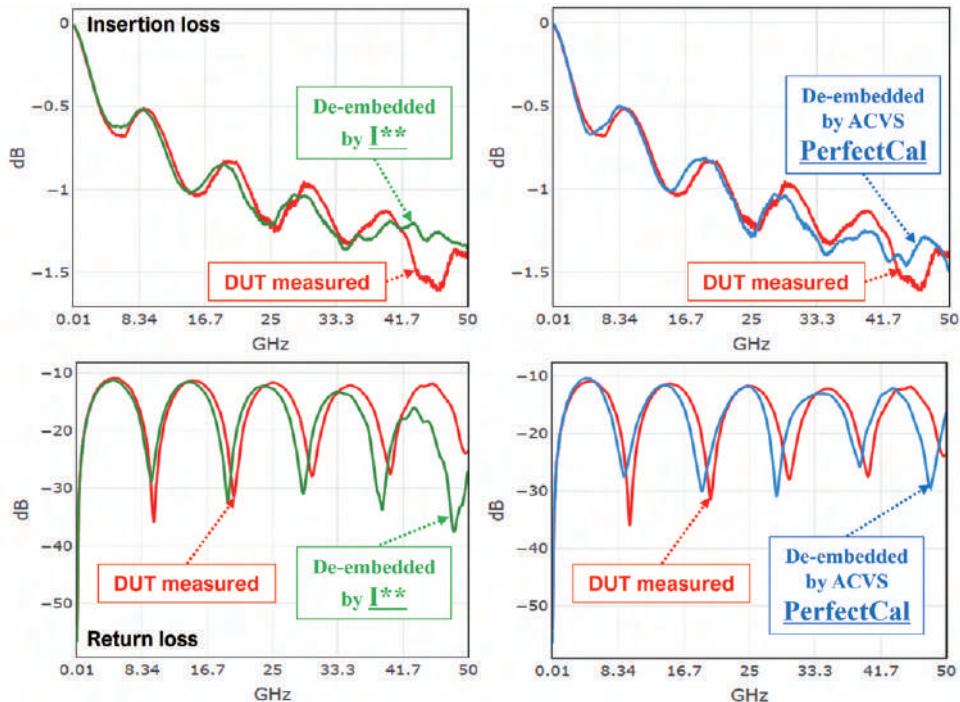
| Case study: Measurement of transmission lines (up to 50GHz)



DUT : CPWG 10mm (Z0: 70 ohm) and 2xThru Fixture



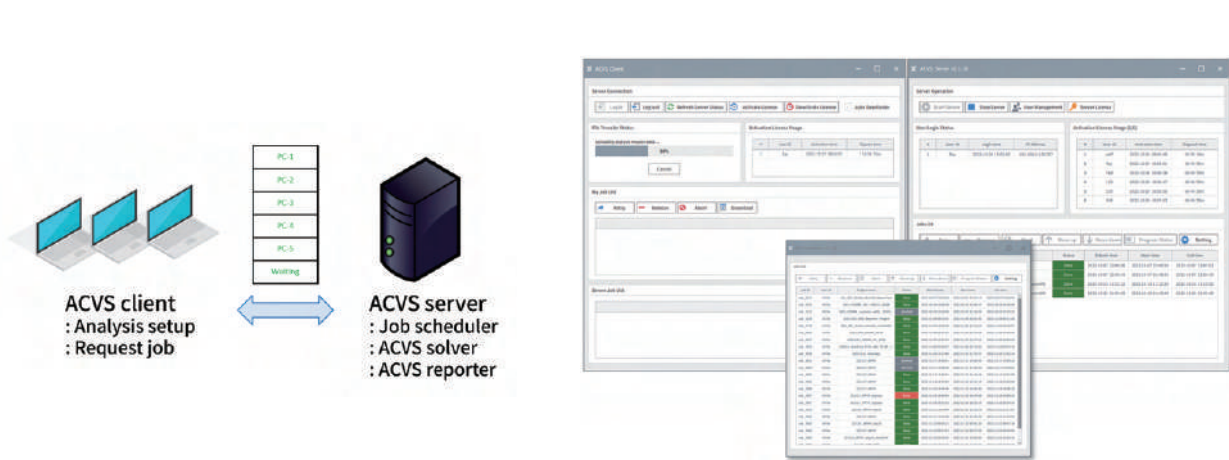
Measurement Setup @ Huwin Lab
(Keysight PNA N5225B, T-plus uProbe)



Direct Probing (DUT measured) vs De-embedded (I** vs ACVS PerfectCal)

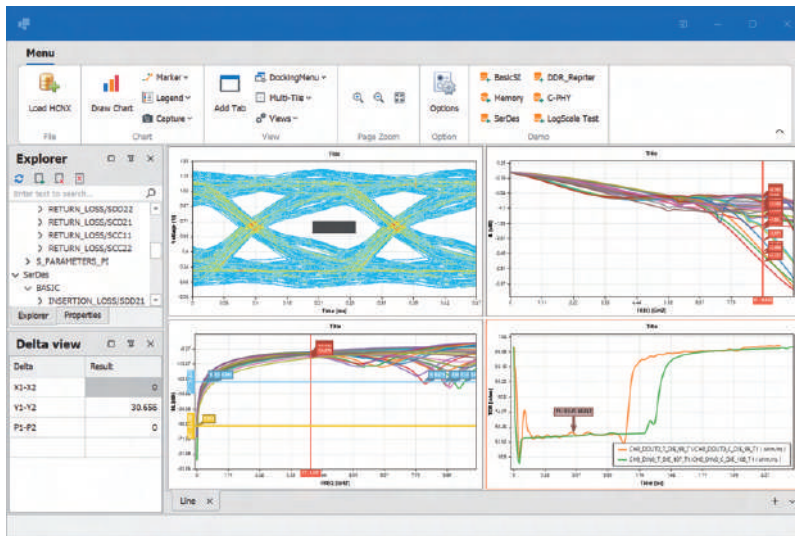
ACVS Advanced Channel Verification System

| ACVS Server-Client Option



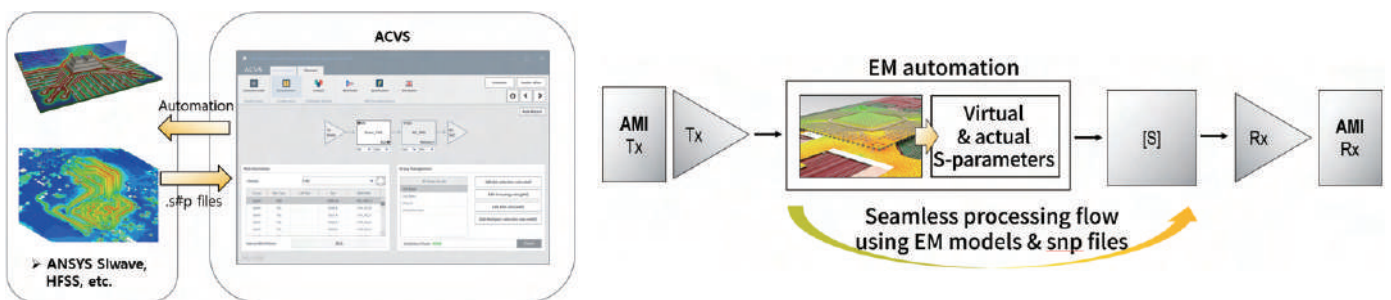
ACVS Server-Client: Multiple ACVS Clients Can Utilize a Single ACVS Server.

| ACVS ChartNX



The Advanced and Innovative Standalone Charting Tool in ACVS.

| EM automation



Fully Integrated EM Automation (S-parameter extraction) with SerDes AMI Simulation.

SnpView.com Easy, Fast and Accurate Channel Analysis Service

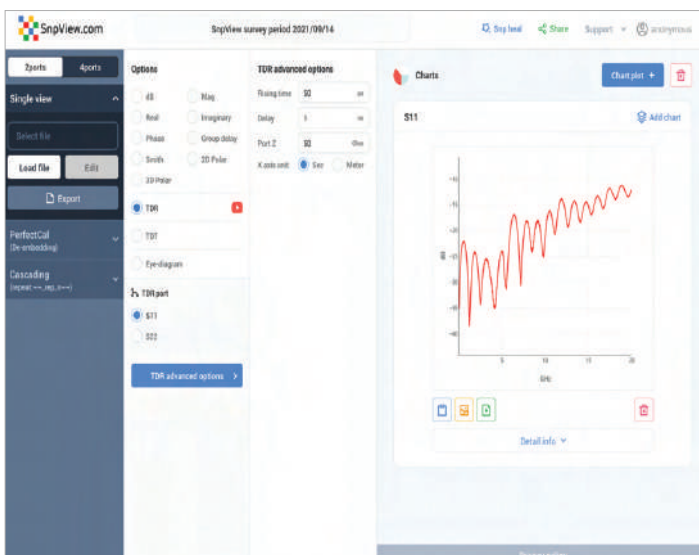


Channel analysis with S-parameters is often costly and time-intensive, requiring high-performance servers, advanced simulators, and complex setups that lead to extended computation times. Snpview.com simplifies this process with a web-based channel analysis service. Using only a local PC and web browser, users can perform key analyses like TDR, TDT, and eye-diagrams quickly and accurately. Our advanced time-domain methods deliver fast, precise results, making channel analysis more efficient, accessible, and cost-effective.

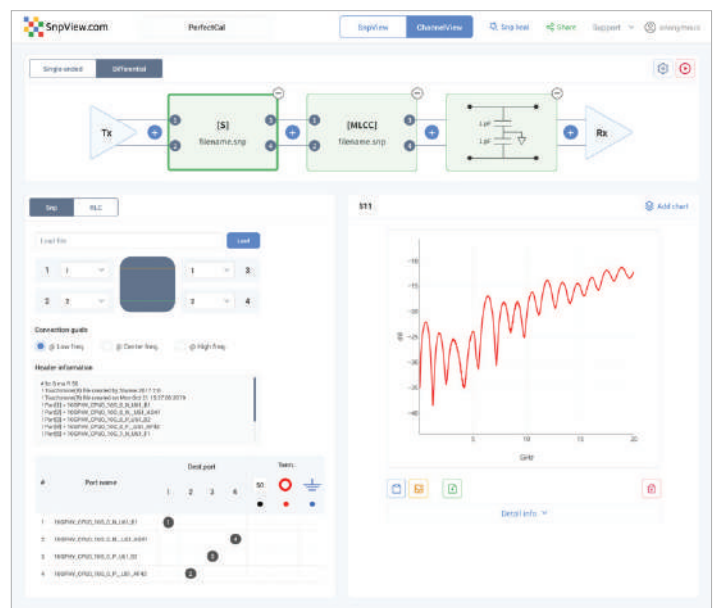
Snpview.com is an accessible web-based solution for channel analysis. It eliminates the need for costly computing servers, allowing users to perform analyses anytime, anywhere using just a web browser. With advanced time-domain methods, Snpview.com delivers fast and precise results. It supports key analysis tools for channel verification and facilitates high-speed channel simulation, meeting the demands of modern channel analysis.

Key Benefits

- Easy view of S-parameters
- Fast and accurate time domain analysis methods
 - : TDR, TDT, eye-diagram, BER
- PerfectCal®
 - : 2xThru de-embedding with impedance correction
- ChannelView
 - : High-speed channel simulator with EQ/Jitter

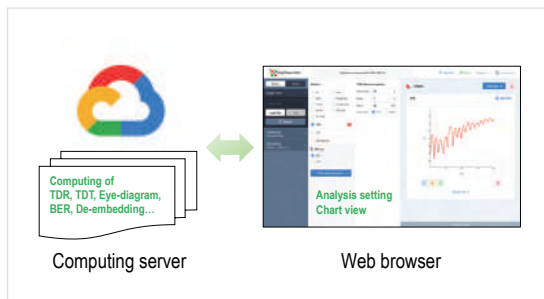


SnpView

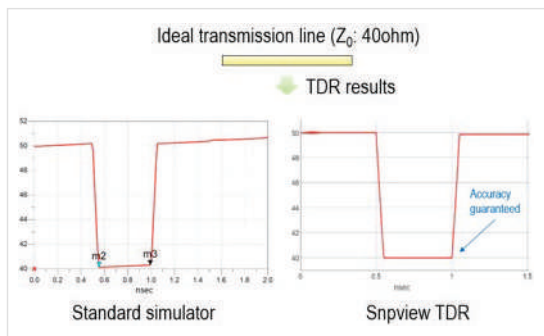


ChannelView

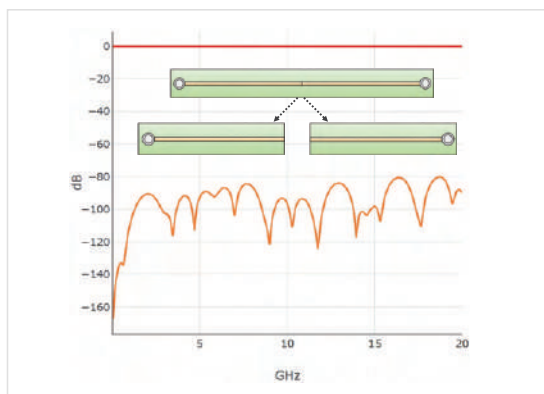
SnpView.com Easy, Fast and Accurate Channel Analysis on Web



Architecture of the Snpview.com



Comparison of TDR accuracy



Calibration results of 'PerfectCal'
: Half gating thru fixture.
: Support de-embedding function.



ChannelView
: High-speed channel simulator with EQ/Jitter
: Support PAM4 simulation

Efficient way for channel analysis

Usually, channel analysis is expensive and time-consuming. First of all, channel simulator and high-performance computing servers are needed for analysis. In addition, complicated analysis settings and long simulation times for channel analysis increase the development time of the system. Snpview.com is a web-based channel analysis solution that provides analysis results anytime and anywhere without the limitations of the computing environment.

- **Computing on the Snpview server**
- **Unnecessary for high performance PC**
- **Required only 'Chrome' or 'Edge' web browser**
- **Easy setup for channel analysis**

Fast and accurate time domain methods

More sophisticated techniques are required to conduct time-domain analysis using S-parameters. Snpview.com offers the following methods to maximize the efficiency and accuracy of time-domain analyses.

- **Band-limited S-parameter to causal time response**
: Most of the S-parameters obtained through measurement or simulation are of limited bandwidth. Under these S-parameter conditions, the extrapolation method is applied to ensure the accuracy of transient simulation results. The extrapolation method developed by Huwin enables conversion to causal time response while maintaining the inherent characteristics of the band-limited S-parameter.
- **The accurate TDR and TDT**
- **Fast eye-diagram estimation**
: Fast and accurate estimation of worst-case eye-diagrams is possible using the channel system's step response and optimization algorithms.
- **Fast BER estimation**
: Fast and accurate BER estimation are possible using the channel system's step response and statistical approach.
- **PerfectCal® : 2xThru de-embedding with impedance correction**
: Supporting an accurate half gating function for the thru-fixture structure. Therefore, the de-embedding of the fixture-DUT-fixture structure is possible.
- **ChannelView**
: The time domain simulation of high-speed channel with the accurate impulse responses, Tx/Rx EQ, jitter and noise.

Additional functions for user convenience

- **Heal function**
: Supporting the function to enforce causality and passivity of S-parameter.
- **Sharing analysis results**
: Sharing S-parameters and analysis results. An open link can be created and sent to other users.



All demo clips



For FREE ACVS evaluation license, just send email to Brian(brian.lee@huwin.com) and you can get the most accurate and the most convenient tool to help your Memory and SerDes channel analysis and reporting job.

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 'Huwin'

 <http://www.Huwin.com>

Huwin Solutions

| ACVS

- Full automation of channel verification

| ACVS-GSI

- SerDes channel analysis
- ANSYS SIwave automation
- Report automation

| Snpview.com

- Web-based channel simulator and Thru-fixture gating for de-embedding