Industry Application Examples

Circuit Migration & Porting

- 10nm → 5nm Low-Power Amplifier & ADC Buffer Porting
- 16nm → 7nm – High-Speed Clock Generator Porting
- 28nm → 14nm – Schematic Porting of DDRx Interfaces
- 40nm → 28nm – Migration of IP for extreme low power dissipation
- 55nm → 40nm – Porting and Retargeting of Bandgap Voltage References and many more

Circuit Sizing, Tuning & Retargeting

- 5nm - Standard Cell Design optimization and retargeting
- 7nm - read path optimization for speed and stability
- 10nm – Yield optimization of High-Speed Transceivers
- 14nm – Batch Mode Sizing of FinFET General Purpose I/O & Memory Interface Macros
- 16nm - ADCSample & Hold Mismatch Analysis and Sizing
- 22nm - Performance & Corner Optimization of DDRx High-Speed I/O in FDSOI Technology
- 28nm - Path Delay Optimization of Receiver with 1300 Transistors for DRAM Memory
- 40nm - I/O Design Optimization Flow for Reliability
- 65nm – Standard Cell Design optimization and retargeting
- 90nm - Reliability & Yield Optimization of Relaxation
- 130nm - Optimization of Low-power Fully Differential OTA
- And many more

Circuit Analysis, Verification & High-Sigma

- 3nm – SRAM Bitcell High Sigma Analysis for 8sigma
- 5nm – Oscillator High Sigma & Yield Verification
- 7nm - SRAM Bitcell Analysis for 6,5 sigma
- 10nm – FPGA CRAM cell analysis for 6.5 sigma
- 14nm – Fail analysis of Digital Temperature Sensors in Non-Volatile Memory
- 28nm – Debugging & Verification of 10bit SAR ADC
- 40nm – Process related yield debug and optimization of analog IP
- 55nm – PLL statistical analysis and optimization
- 65nm – Monte-Carlo analysis of 195k device High-Speed Clock Generator
- 90nm – Worst Case Analysis of matrix of sense amplifiers with 210k devices
- 130nm – Circuit Sensitivities for High-Performance Automotive Power Amplifiers and many more

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Selected Customer References

STMicroelectronics: "MunEDA WiCkeD is a substantial part of our reliability-based design flow for our CMOS and FDSOI technologies and extremely useful for design optimization of standard I/Os to meet tight specifications, ensure good design margins and reduce the design time dramatically " (MUGM)

Infineon: "MunEDA WiCkeD WiCkeD has been seamlessly integrated in the design flow of Infineon for more than a decade" (MUGM)

Samsung: "With MunEDA's tools for design optimization and statistical analysis of FinFET memory interface IP blocks we achieved an average reduction of design turnaround time of 50%, more than 6% performance improvement and up to 15% area reduction." (MUGM)

SMIC: "With MunEDA WiCkeD's optimization tools we have reduced the power consumption of an ultra low power reference voltage design for IoT applications by phantastic 40% down" (SemiWiki)

Find more customer references at www.muneda.com

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EDA Tools for Migration, Sizing and Verification of Custom IC Designs

MunEDA WiCkeD™ is the leading EDA software tool suite for circuit & IP migration & porting, circuit analysis & verification, and sizing & optimization of custom IC designs (analog, mixed-signal, RF, digital).

MunEDA's solutions support our customers to reduce design time and efforts.

Circuit design engineers analyze and optimize their designs with MunEDA tools to meet specifications, improve performances, robustness and yield, to reduce power consumption, area, and sensitivity to operating, aging and degradation effects.

Circuit Porting & Migration Tools

Circuit Sizing & Optimization Tools

Circuit Analysis & Verification Tools

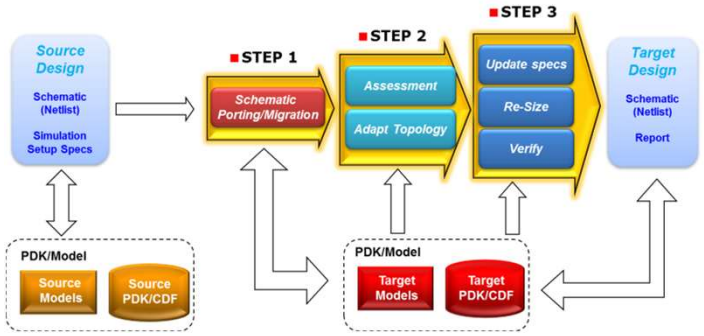
Circuit High-Sigma & Variation Tools

Circuit Migration with SPT

MunEDA WiCkeD™ SPT Schematic Porting Tool for circuit schematic migration and IP porting between different process technologies

Circuit Migration & Porting with MunEDA WiCkeD™ SPT

MunEDA SPT Schematic Porting Tool is part of a comprehensive solution for fast and reliable circuit migration & IP porting of custom IC circuits between different process technologies.



Key features of MunEDA SPT Schematic Porting Tool

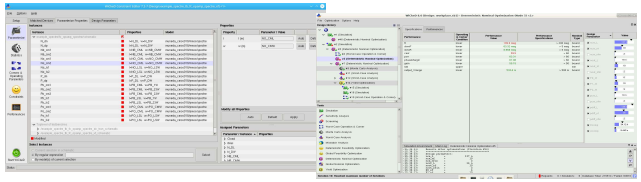
- Automated schematic porting within seconds or minutes instead of tedious manual work for days or weeks
- Easy setup by a convenient GUI interface for all operations by the user instead of error prone inhouse scripting
- Flexible property mapping with configurable rules
- Handles terminal name changes, different, extra or deleted terminals, different positions, placement and orientation of schematic symbols and many more
- Customer & silicon proven with many different foundry PDKs

WiCkeD™ Circuit Sizing & Tuning

Meet performance specifications over all types of variation, design and operation parameters with MunEDA sizing & optimization tools

Circuit Sizing & Tuning with MunEDA WiCkeD™

WiCkeD is a powerful optimization engine for automatic circuit sizing and optimization. WiCkeD improves circuit performance values, robustness, power consumption and area by changing design parameters with its highly efficient optimization algorithms. Main application fields include advanced analog/RF design, low power / low voltage design, as well as custom digital circuits.



Key Features of WiCkeD™ Circuit Sizing & Tuning

- Supports CMOS, FDSOI, FinFET technologies a.o.
- Explore trade-offs between power, speed, yield, and performance faster and better than ever before
- Tune circuits for better robustness by design centering
- Reduce design effort and design time
- Simultaneously handles multiple specs, tests, corners, and operating point constraints

WiCkeD™ Circuit Sizing Constraints

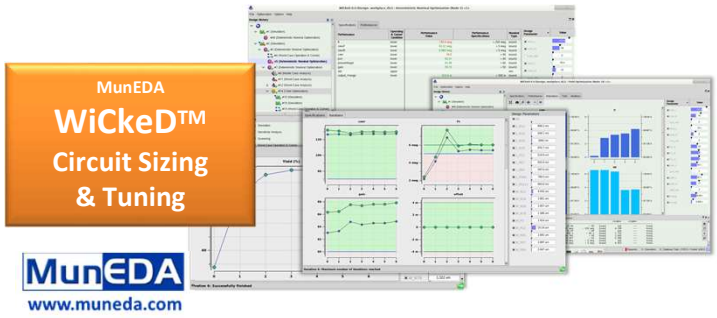
WiCkeD™ Performance Optimization

WiCkeD™ Circuit Yield Optimization

WiCkeD™ Low Power Optimization

WiCkeD™ Area, Noise, Parasitics, Mismatch

WiCkeD™ Robustness Optimization



Circuit Analysis & Verification Tools

Analyze and verify your circuit designs for constraints, performance specifications, operating and process parameters, global variaion, mismatch and reliability

Circuit Analysis & Verification with MunEDA WiCkeD™

WiCkeD provides the designer with the most powerful PVT & Monte Carlo techniques for parametric yield analysis and verification with minimum number of simulation runs.
With WCA the circuit designer is able to calculate statistical worst-case conditions of the circuit.

WiCkeD™ Circuit & Sensitivity Analysis

WiCkeD™ PVT & Corner Analysis

WiCkeD™ Monte Carlo Statistical Analysis 3-5 sigma plus

WiCkeD™ Multi Testbench

WiCkeD™ Trimming Screening

WiCkeD™ Mismatch Constraints

High Sigma, Yield & Variation Tools

Analyze and verify Variation-aware circuit designs, Fast Monte Carlo, Worst-Cases, High Sigma process parameters, global variation, mismatch and reliability

Circuit High Sigma & Variation Analysis & Verification

WiCkeD provides the designer with the most powerful PVT & Monte Carlo techniques for parametric yield analysis and verification with minimum number of simulation runs.
With WCA the circuit designer is able to calculate statistical worst-case conditions of the circuit.

WiCkeD™ High Sigma High-Sigma Analysis 6-9 sigma plus

WiCkeD™ Worst Case Worst Case Analysis 6-12 sigma plus

WiCkeD™ Reliability Reliability & Aging Analysis

Key Features of WiCkeD™ Circuit Analysis & Verification

- Constraint Generation / Editor / Management
- Sensitivity Analysis for geometries, environment, aging, process and on-chip variation
- Fast PVT & Operating Corner Analysis calculates influence of corner cases on given circuit performance metrics
- Fast & Enhanced Monte Carlo Analysis (3-5 sigma plus)
- Multiple specs, testbenches, operating point constraints
- Dynamic sampling, Hierarchical sensitivities
- Interactive scatter plots and yield improvement

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