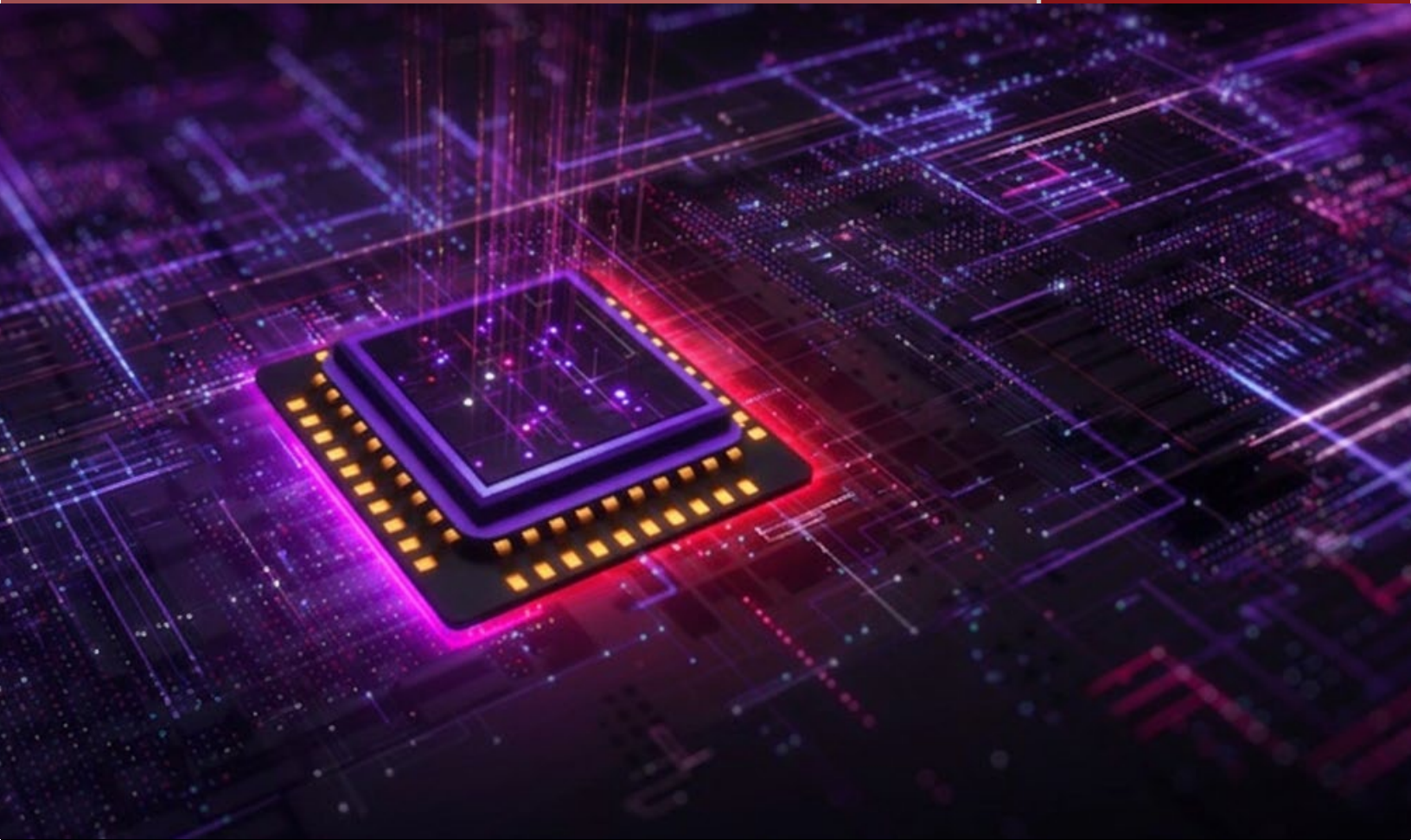




RSoft Photonic Device Tools

Accurate Device Simulation, Automated Optimization,
Multiphysics Analysis, and Connected Workflows with
ADS Photonic Designer

The Connected Photonic Design Workflow

RSoft Photonic Device Tools provide a comprehensive portfolio of simulators and optimizers for passive and active photonic devices. Users can model light propagation, scattering, modes, gratings, lasers, LEDs, material and carrier effects, and manufacturing-sensitive behavior in a common CAD environment.

For photonic integrated circuit development, RSoft device-level simulation connects with ADS Photonic Designer. Users can create or refine photonic building blocks in RSoft, generate compact models and custom PDK cells, and use those models in ADS for schematic-driven circuit simulation, layout generation, verification, and broader electrical-optical-electrical analysis.

With this Workflow, You Can:

- Accelerate virtual prototyping with physics-based simulation methods selected for the device and application.
- Automate parameter sweeps and multi-variable optimization with RSoft MOST and Topology Optimizer.
- Analyze optical performance under electrical, thermal, stress, and carrier effects using multiphysics workflows.
- Create foundry-specific PIC building blocks and augment PDKs with custom components.
- Connect optimized device models to ADS Photonic Designer for circuit simulation and layout.
- Exchange optical data with CODE V and LightTools for workflows that bridge wave and ray optics.

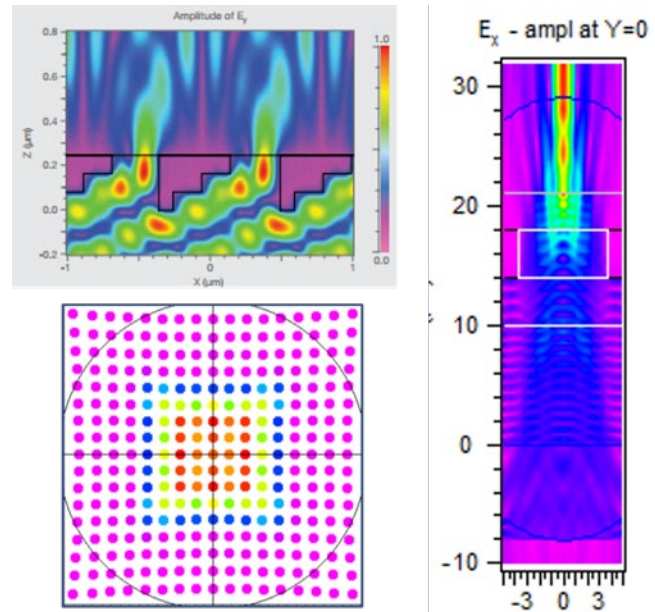
RSoft Photonics Device Tools at a Glance

Tool or Utility	Primary Role
RSoft CAD environment	Common geometry, material, simulation, and results environment for photonic device design
FullWAVE FDTD	Finite-difference time-domain analysis for light propagation in photonic structures, circuits, and nanophotonic devices
BeamPROP BPM	Beam propagation method for integrated and fiber-optic waveguide devices and circuits
DiffractionMOD RCWA	Rigorous coupled-wave analysis for diffractive, periodic, and subwavelength optical structures
BandSOLVE PWE	Plane-wave expansion analysis for photonic band structures and photonic crystal devices
FemSIM FEM	Finite-element mode calculation for arbitrary structures on non-uniform meshes
GratingMOD CMT	Coupled-mode analysis for complex optical fibers and integrated waveguide circuits
ModePROP EME	Eigenmode expansion propagation including forward, backward, and radiation modes
MetaOptic designer	Inverse design and optimization of metasurfaces and metalenses for compact imaging, sensing, and display applications
LaserMOD	Optical, electronic, and thermal simulation for semiconductor lasers and related active devices
LED utility	LED structure simulation, emission, and extraction analysis
Solar cell utility	Optical simulation for solar-cell design and analysis
Multi-physics utility	Carrier-induced, stress-optic, electro-optic, and thermo-optic analysis with passive-device simulation tools
Tapered laser utility	Utility to design tapered lasers
MOST	Automated multi-variable optimization and parameter scanning
Photonic device compiler	Generation of foundry-specific PIC building blocks and custom components for PDKs
Topology optimizer	Free-form inverse design tool for designing photonic devices

Diffractive Optical Elements and Metaoptics

Recommended tools: DiffractMOD RCWA, FullWAVE FDTD, MetaOptic Designer, MOST

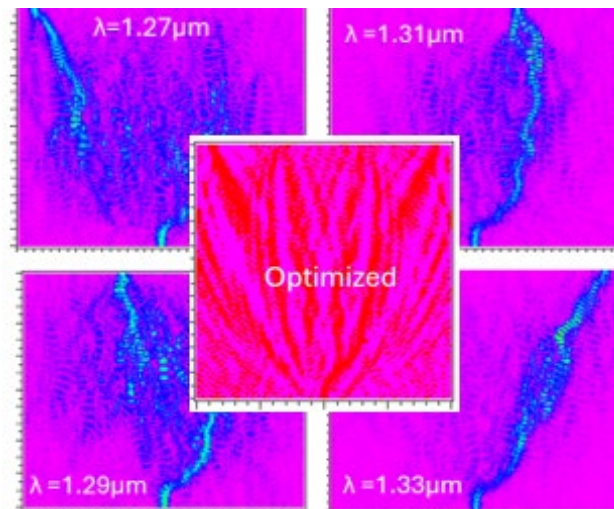
- Model transmitted and reflected diffraction, diffraction efficiency, fields, far-field response, spectra, incident-angle response, and polarization dependence.
- Generate BSDF data for downstream optical analysis and connect wave-optics results with CODE V or LightTools workflows.
- Explore periodic structures, metalenses, metasurfaces, photonic crystals, plasmonic structures, and freeform topology-optimized devices.



Integrated Photonics and PIC Building Blocks

Recommended tools: BeamPROP BPM, FullWAVE FDTD, ModePROP EME, FemSIM FEM, MOST, Topology Optimizer, Photonic Device Compiler

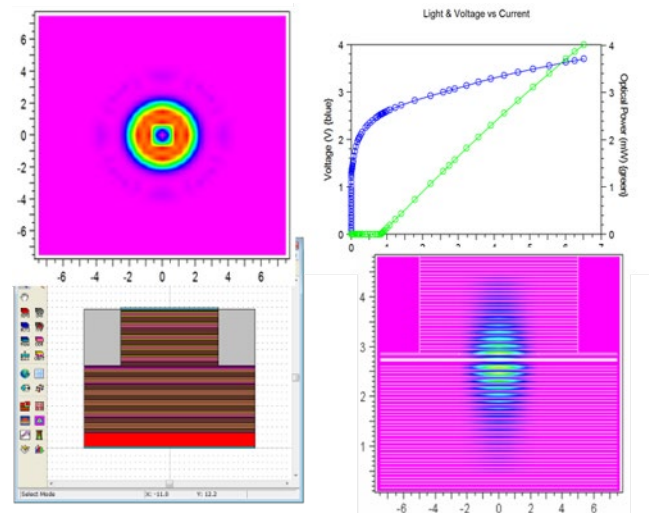
- Design and optimize waveguides, bends, splitters, couplers, multimode interference devices, filters, resonators, modulators, gratings, and wavelength-routing components.
- Choose an appropriate numerical method for mode solving, propagation, reflections, radiation, or full-wave behavior.
- Automate scans and optimization, then generate compact models or custom PDK cells for circuit-level use.



Semiconductor Lasers and Emitters

Recommended tools: LaserMOD, Tapered Laser Utility, LED Utility, FullWAVE FDTD

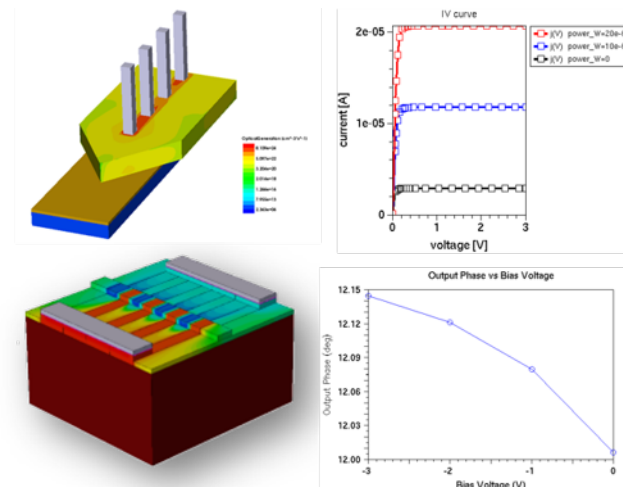
- Analyze cavity modes, optical spectra, gain, carrier transport, thermal behavior, self-heating, spatial hole burning, L-I-V response, and far-field patterns for semiconductor lasers.
- Evaluate optical extraction, polarization, textured structures, and emission behavior for LED structures.
- Analyze and optimize tapered semiconductor laser diodes.



Optoelectronic and Multiphysics Devices

Recommended tools: FemSIM FEM, FullWAVE FDTD, BeamPROP BPM, Multi-Physics Utility

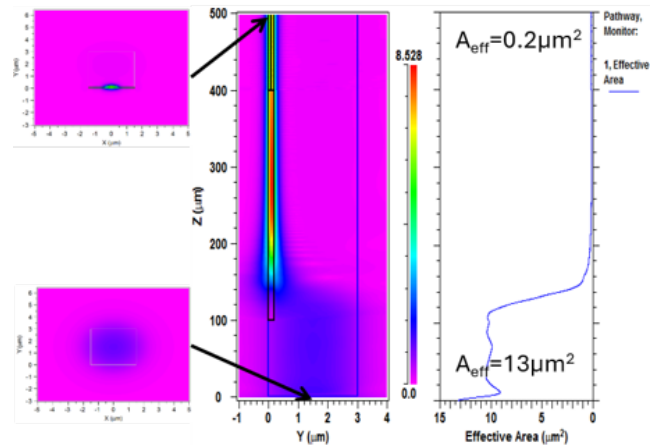
- Model carrier distributions, optical absorption, and field propagation for modulators, photodetectors.
- Model stress-optic, electro-optic, thermo-optic, and carrier-induced effects to evaluate device performance under real-world operating conditions. effects in device analysis.
- Connect RSoft and Synopsys Sentaurus TCAD workflows for optical and electronic co-simulation.



Fiber, Waveguide, and Optical I/O Design

Recommended tools: BeamPROP BPM, ModePROP EME, GratingMOD CMT, FullWAVE FDTD, MOST, Topology Optimizer

- Design integrated and fiber-optic waveguide devices, gratings, mode converters, edge couplers, and fiber/waveguide-coupling structures.
- Analyze mode evolution, coupling, radiation, reflection, polarization, and alignment sensitivity.
- Combine solvers for complex propagation problems and optimize coupling efficiency and tolerances.

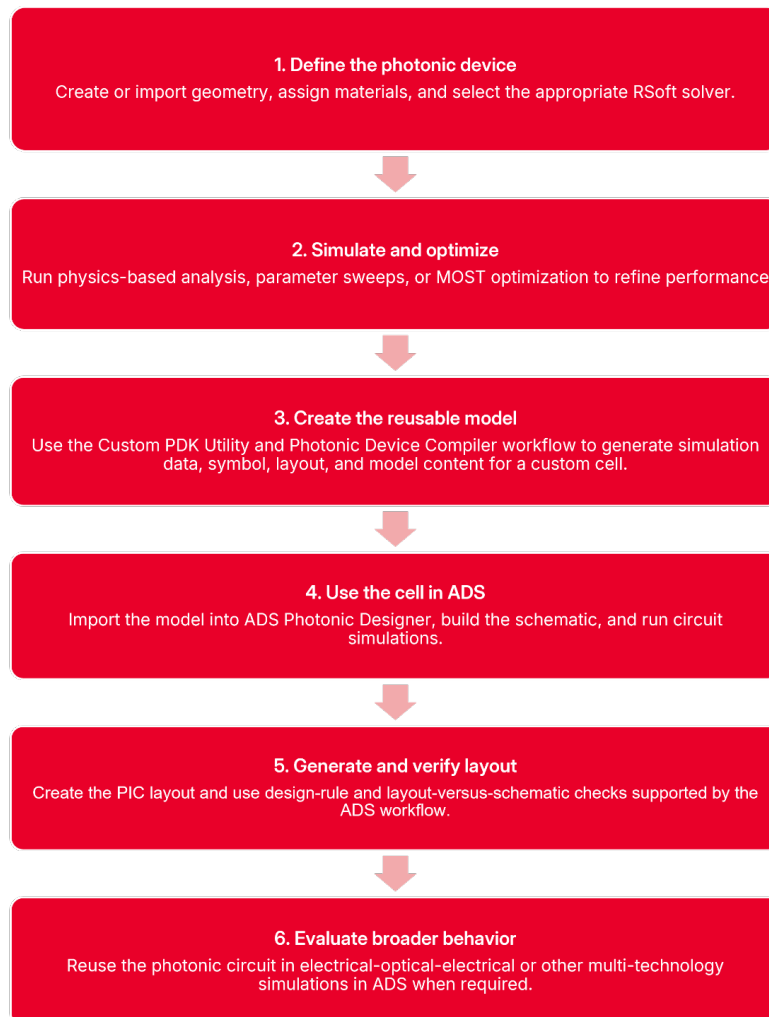


ADS Photonic Designer + RSoft

Complementary Roles

RSoft Photonic Device Tools	ADS Photonic Designer	Connected Value
Physics-based device modeling and optimization	PIC schematic capture and circuit simulation	Use optimized device behavior in circuit context
2D, 2.5D, and 3D solver portfolio	Integrated optical finite-difference eigenmode solver	Select appropriate levels of model fidelity
Parametric model generation and custom PDK creation	PDK-based design, symbols, layout, DRC, and LVS	Create reusable, foundry-oriented design cells
Detailed simulation of custom components	Circuit, layout, and electrical-phonic analysis in ADS	Connect component changes to circuit and system performance

Representative Device-to-Circuit Workflow



Use RSoft Photonic Device Tools when...

The primary need is detailed device physics, solver choice, geometry optimization, multiphysics analysis, metaoptics, laser or emitter simulation, optical I/O analysis, or custom PIC building-block creation.

Use ADS Photonic Designer when...

The primary need is PIC schematic and circuit simulation, PDK-based design, layout generation, design verification, compact-model use, or design in the broader ADS environment.

Use the connected workflow when...

A custom or optimized device must be carried into circuit simulation, layout, or electrical-optical-electrical analysis, and device changes must be evaluated in a larger design context.

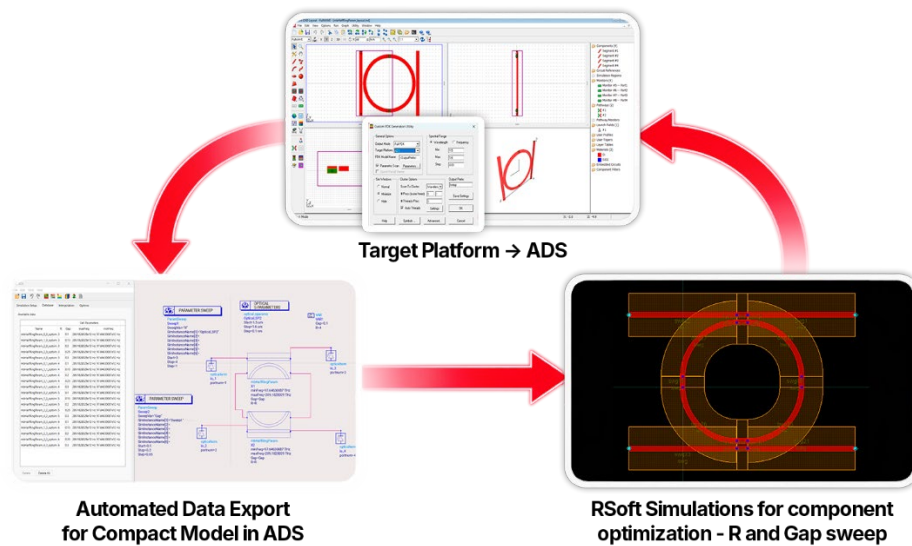


Figure 1. Optimization using RSoft tools

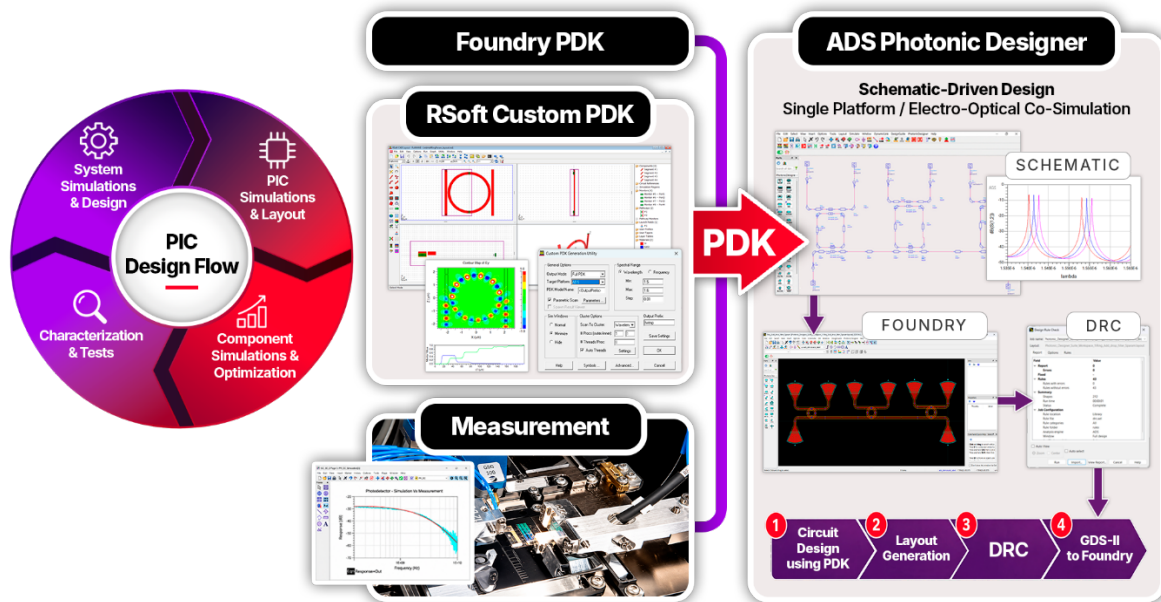


Figure 2. Integrated PIC design flow with RSoft and ADS Photonic Designer

Design Photonic Devices with the Right Level of Physics

RSoft Photonic Device Tools help engineering teams model, analyze, and optimize passive and active photonic devices across a wide range of applications. Use the solver or utility that fits the design challenge, automate exploration and optimization, and connect device results to optical, semiconductor, circuit, and system workflows.

Connect Component Innovation to PIC Implementation

For integrated photonics, combine RSoft device simulation with ADS Photonic Designer. Create custom photonic components, carry compact models into circuit simulation, generate and verify layout, and evaluate performance in the broader ADS environment.

Learn More

RSoft Photonic Device Tools: <https://www.keysight.com/us/en/products/software/optical-solutions-software/photonic-design-solutions.html>

ADS Photonic Designer: <https://www.keysight.com/us/en/product/W3803B/photonic-designer.html>

Photonic design automation resources:

<https://www.keysight.com/us/en/lib/resources/miscellaneous/eda-software/photonic-design-automation-software.html>



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