

Design Environment

Computer-aided design (CAD) tools, physical/process design kits (PDKs) and methodologies for research in the areas of photonics, microelectronics, MEMS and embedded systems.

- Altium Designer
- ANSYS Campus Solutions**
- Cadence University Bundle**
- COMSOL**
- CoventorMP**
- Crosslight**
- Design Workshop 2000
- FEI Amira/Avizo 3D
- Keysight EEsof EDA**
- Lucedra IPKISS
- Lumerical Interconnect
- MEMS Pro
- Mentor Graphics – HEP Program**
- Optiwave OptiBPM/OptiFDTD
- Photon Design**
- Solido Variation Designer
- Solidworks Professional
- Synopsys – NA Bundle**
- Synopsys RSoft
- Tanner EDA**
- Zemax Optic Studio Professional

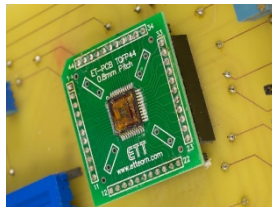
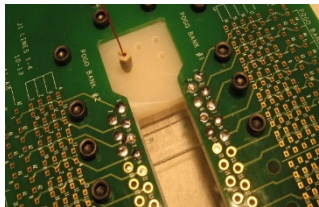
... plus Application Notes, User/Methodology Guides, Tutorials, Reference Designs, PDKs and Training

Development Systems and Embedded Software

Platform-based microsystems design and prototyping environments and related software:

- Hardware platforms*: FPGA-based (Xilinx, Intel), GPGPU (NVIDIA), Multiprocessor (Intel Xeon Phi), Heterogeneous Processing#, Software Defined Radio, Wireless Sensor Nodes
- Software development and debug: ARM DS-5 and FastModels + D-STREAM debug modules, IAR Embedded Workbench, Embedded Linux, OpenCL
- Middleware/Software Frameworks: Heterogeneous Computing Middleware Platform (HCMP)#, Deep Learning TensorFlow
- Real-time Embedded Systems(RES)#: Links to the RES Laboratory at the University of Waterloo
- Software and IP: Xilinx FPGA**, Intel FPGA**, LabView, Mentor Graphics Precision RTL/Modelsim, Synopsys Synplify/Identify, VectorBlox MXP Matrix Processor

... plus Application Notes, User Guides, Tutorials, Software Standards, Training



Prototyping Services

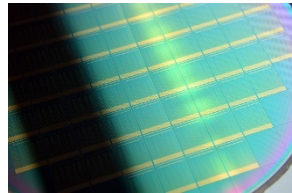
Custom and multi-project wafer (MPW) prototyping in commercial foundries and university laboratories.

Commercially-sourced Prototyping

- CMOS (nm): 28 FDSOI#, 65# & 130 RF-GP, 180 BCD, 180 & 350 MS-GP, 350 HV, 350 Opto
- GaN on SiC (microelectronics): 500nm#
- Silicon Photonics: SOI Passives, SOI Actives#
- Epitaxy: III-V on InP and GaAs Substrates
- MEMS: Piezo, Polysilicon, MEMS Integrated Design for Inertial Sensors (MIDIS)#

University-based Prototyping (including TCAD support)

- Fabrication, Assembly, Characterization and Test (FACT)# services from 5 university labs
 - Web portal linking to 44 open-access micro-nanotechnology (MNT) facilities in 19 institutions
 - Peer-reviewed financial assistance (up to 80% of cost to a max of \$2K) for hands-on fabrication
 - TCAD: camLine XperiDesk, Synopsys Sentaurus
- ... plus Application Notes, User Guides, Training and Technical Reports



Packaging and Assembly

Commercially- and academically-sourced packaging and assembly solutions

- Standard: DIP, CFP/CFQP, CPGA, die-on-glass
- Custom Packaging and Assembly, e.g., single or multi-die (stacked) assembly, photonics on 14-pin butterfly#?, die bumping#?, flip chip#?, parylene coating#? and more....

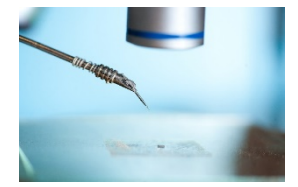
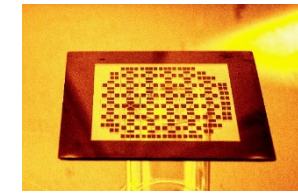
... plus Application Notes and User Guides

... plus Business and Technology Reports, Workshops and Webinars

* Shared access, either on-site, from the Equipment Pool or via the CNDN Cloud

** multiple tools contained within these tool suites

capability developed/enhanced by collaborative platform development projects



Test Equipment and Resources

Test and characterization instrumentation from leading manufacturers available on short-term loan, and characterization systems

- Analyzers: Impedance/ Microwave Network/ Parameter/ Signal/ Spectrum/ Vector Network
- Generators: Arbitrary Waveform/ Microwave Impedance/ RF-Microwave Analog Signal/ RF Vector Signal/ Pattern/ Pulse/ Pulse-Pattern/ Signal
- Meters: Autotuning/ Function/ LCR/ Noise-Figure/ Optical Spectrometer/ Source Measurement
- Miscellaneous: Microscopes/ Infrared Video Cameras/ Probe Stations/ Rotary Motion Simulator/ Solid State Noise-Source/ WirelessHART Network Kit/ Tunable Lasers
- Oscilloscopes: Mixed-Signal/ Digital Storage
- PXI: Chassis and cards including VNA, VSA, VSG, SMU, Oscilloscope and Embedded Controller
- Plus a range of instrument modules, probes, calibration kits and accessories
- Microsystems Integration Platforms#: MEMS, Microfluidics, Micromirror, RF-MEMS, Si-Photonics ... plus Application Notes and User Guides

Collaborative Platform-Development Projects

Collaborative projects with Canadian academics and industry to seed new capability. In progress:

- Design: Nanofabrication Process Design Environment / Design Platform For Silicon Photonics
- Development Systems: Heterogeneous Embedded Computing Platform
- Prototyping: Interposer/ Open-Gate Silicon JFET
- Packaging and Assembly: Flip-chip assembly for full 2.5D integration/ Optical Packaging



Products and Services for Canada's National Design Network