PLECS RT BOX®
Hardware-in-the-Loop (HIL) Platform

Plexim’s product line now includes real-time simulation hardware to provide a complete, one-stop solution for modern power electronic system development teams.

Technical Specifications

- Processor: Xilinx Zynq Z-7030
- CPU clock speed: 1 GHz

- Analog input
  - Channels: 16
  - Resolution: 16 bit
  - Voltage range: -10 ... 10 V
  - Input type: Differential
  - Sample rate: 2 Msps
  - Input impedance: 1 MO, 24 pF
  - Protection: Overvolt., ESD
  - Connector: D-SUB 37 pin male

- Analog output
  - Channels: 16
  - Resolution: 16 bit
  - Voltage ranges: -10 ... 10 V, 0 ... 10 V, -5 ... 5 V, 0 ... 5 V
  - Sample rate: 2 Msps
  - Output impedance: 0 MO
  - Output current: ≤ 5 mA
  - Protection: Short-circuit, Overvolt., ESD
  - Connector: D-SUB 37 pin female

- Digital input
  - Channels: 32
  - Logic levels: 3.3 V (5 V tolerant)
  - Protection: Overvolt., ESD
  - Connector: D-SUB 37 pin male

- Digital output
  - Channels: 32
  - Logic levels: 5 V, 3.3 V
  - Output impedance: 250 Ω
  - Protection: Short-circuit, Overvolt., ESD
  - Connector: D-SUB 37 pin female

- Connectivity
  - Ethernet: RJ-45, Gigabit 4 x SFP+, 6.25 Gbps per lane
  - High speed interconnect: USB 2.0 high speed, Type A, Type B
  - USB device: 2.0
  - Host PC: SD card

- Power supply
  - Internal: 100 ... 240 Vac
  - 50 ... 60 Hz

- Size
  - D x W x H: 31 x 25 x 10cm

The PLECS RT Box is a state-of-the-art real-time simulator designed for HIL testing of complex power converter systems. The unit may also be scaled up for more demanding HIL applications, such as modular multi-level HVDC converters.
This allows inspecting signal waveforms for different use cases and ensuring they are accurate enough for system testing purposes.

**Specialized Switch Models**

Specifically for real-time code generation, PLECS’ component library includes Power Modules. These blocks implement power-stage topologies such as choppers, 2 and 3-level half bridges, and cascaded half and full bridges, all optimized for real-time simulation of models containing many switches.

**Simulation Speed**

The most meaningful metric when comparing the “speed” of real-time simulators is overall roundtrip latency, i.e. total time elapsed from measuring inputs to updating outputs. Delays depend on the underlying hardware topology. Several approaches exist, all with tradeoffs. The PLECS RT Box is based on an SOC, optimizing I/O latency, numerical performance and modeling flexibility. The latest generation of 16-bit ADC and DAC chips ensures excellent signal resolution. The digital capture module can resolve PWM signals at 10 ns.

**Outlook**

The PLECS RT Box is designed with the future in mind. With its high-speed communication interface, multiple RT Boxes can operate in parallel or in a master/slave arrangement. Such configurations leverage PLECS solver and coder technologies currently being developed, making the platform even more powerful and suitable for complex, large scale real-time simulations.

Plexim’s product portfolio now covers all aspects of virtual system testing. We offer a one-stop solution with a unified user experience and the trusted power of PLECS.