

eMEGASIM | OP4510

Comprehensive protection system for research & education



eMEGASIM

Open and flexible
HIL Solution for
protection relays
based on Simscape
Power Systems™

HIGHLIGHTS

- Optimize the real-time performance of Simscape Power Systems (SPS) with ARTEMiS SSN, a specialized power system solver
- Unprecedented speed and accuracy with a minimum model time step of 3 microseconds
- Suitable for network tests with up to 75 states (approx. 30 single-phase nodes on one core)

PURPOSE

This solution lets you run your Simscape Power Systems™ models in closed loop to receive detailed EMT simulation feedback. Monitor the behavior of the grid based on the relay under test through a selection of industry communication protocols.

DESCRIPTION

Driven by eMEGASIM, the OP4510 Protection HIL System is designed for R&D testing as well as validation of new protection algorithm.

The OP4510 can be upgraded to the latest communication protocols (such as IEC 61850 Goose and SV), and can easily be combined with an amplifier for a wider range of achievable tests.

APPLICATIONS

Protection function testing via analog and digital interfaces or IEC61850 sampled value and GOOSE, protection scheme testing (including virtual relay library), events analysis.

KEY PERFORMANCE SPECS

- Maximum entry-level network size: 75 states (approx. 30 single-phase nodes on 1 core)
- Control Loop minimum delay: 7 μ s
- Minimum Model Time Step: 3 μ s

TYPICAL USE CASE

HIL Process



System Configuration

HARDWARE

OP4510 Simulator

Intel Xeon CPU - 4 cores - 3.5 GHz, Xilinx FPGA Kintex™-7 325T
Connectivity - Ethernet port 10/100/1000 Mbps (2x RJ45).
RS232 (DB9), USB2.0, 5-Gbit/s high-speed fiber optic link (4x SFP)

Digital Input | 32 channels, 4.5V to 50V, 40 ns high-speed digital I/O

Digital Output | 32 channels, 5 V to 30 V, 200 ns to 65 ns

Analog Input | 16 channels, 16 bits, 500 kS/s, +-20V

Analog Output | 16 channels, 16 bits, 1MS/s, +-16V

Timed Generation and Measurement Firmware | Selectable 32 timed digital inputs and 32 timed digital outputs

Dual-port Gigabit Ethernet Interface Card

Time synchronization card, GPS, IEEE 1588, 1PPS, IRIG-B

SOFTWARE

RT-LAB | Real-time Simulation Software

eMEGASIM FX75 | Real-time Simulation of up to 75 states (sum of capacitors and inductors)

ScopeView | Waveform Visualization and Analysis Software

COMMUNICATION PROTOCOLS

IEC 61850-8-1 GOOSE/Sampled Values/SV data integrity manipulation
C37.118 slave/master
DNP3 slave/master
Modbus slave/master

Baseline

✓

✓

✓
